TANSIAN UNIVERSITY JOURNAL OF ARTS, MANAGEMENT & SOCIAL SCIENCES
Vol 10, Issue 2 (November), 2026; ISSN 2449 – 0334
Available at: https://acjol.org/index.php/tujamss/about/editorialTeam
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EFFECT OF BLOCKCHAIN-BASED SUPPLY CHAIN FINANCING ON PROJECT VIABILITY AND FIELD LABOUR PRODUCTIVITY IN AGRO-INDUSTRIAL PROJECTS: EVIDENCE FROM MEME DIVISION, SOUTHWEST REGION OF CAMEROON

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ABSTRACT
This study investigated the impact of blockchain-based supply chain financing on project viability and field labor productivity in Meme Division, Cameroon. A quantitative, cross sectional survey design was employed, with 351 respondents selected through multi stage stratified random sampling from a target population of 2,850 agro industrial workers. Data were collected using structured questionnaires and analyzed using descriptive statistics and Ordinary Least Squares regression. Findings revealed that blockchain financing significantly and positively affects project viability ($\beta = 0.665$, $B = 0.521$, $p < .001$, $R^2 = 0.442$) and field labor productivity ($\beta = 0.582$, $B = 0.435$, $p < .001$, $R^2 = 0.339$). The study recommends infrastructure investments in network nodes and digital training programs for the local workforce. This research contributes empirical evidence on financial technology adoption in volatile rural economies, extending the Technology Acceptance Model and Financial Inclusion Theory within agrarian contexts.

***Key words:** Blockchain Financing, Supply Chain Financing, Project Viability, Labor Productivity, Agro Industrial Projects, Cameroon*

CITE AS: Ako, E. & Phungeh, D.G. (2026). Effect of blockchain-based supply chain financing on project viability and field labour productivity in agro-industrial projects: evidence from meme division, Southwest Region of Cameroon, *Tansian University Journal of Arts, Management & Social Sciences*, 10(2), 20 - 37.

INTRODUCTION

The modernization of agricultural supply chains in sub-Saharan Africa requires substantial changes to traditional financing and human resource management models. In many developing economies, large agricultural operations face difficulties securing capital due to institutional bottlenecks, strict banking collateral demands, and high transaction costs (Ako & Phungeh, 2024). This lack of credit reduces the viability of agricultural projects and destabilizes daily field operations, as delayed financing often creates wage backlogs and lowers labor productivity. In the Meme Division of the South West Region of Cameroon, these structural problems are exacerbated by an operational environment where physical cash

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delivery and traditional banking channels are frequently interrupted by logistical challenges and regional economic volatility (Ako, 2023a). To address these financial bottlenecks, some agricultural projects have turned to decentralized networks. By using blockchain-based supply chain financing systems, agribusiness enterprises can bypass traditional financial intermediaries, secure upfront credit against documented crop yields, and automate payment distribution via immutable records (Ako, 2026). This digital shift is expected to improve institutional project indicators while directly stabilizing field operations. Understanding how these decentralized financial models impact project metrics and field worker outputs is therefore essential for transforming agricultural project management in volatile regional settings.

Statement of the Problem

Despite the theoretical benefits of decentralized finance, the practical deployment of blockchain systems within volatile agricultural sectors presents implementation challenges. Agribusiness projects in the Meme Division operate in remote areas characterized by unstable telecommunications infrastructure and fragmented digital ecosystems (Ako, 2023b). When management implements decentralized financing platforms to track crop deliveries and disburse wages, technical performance friction often shifts administrative strain onto the local workforce. This operational dynamic creates a distinct paradox. While blockchain financing aims to improve efficiency by automating funding approvals and securing wage lines, it can lower worker morale if local infrastructure cannot support reliable transaction verification. Previous research has largely examined urban financial technology adoption or macroeconomic cryptographic developments, leaving an empirical gap regarding how rural field laborers respond to decentralized structural changes (Ako & Baiye, 2023). This study addresses this gap by analyzing the tradeoffs between blockchain-based supply chain financing, project indicators, and daily labor outputs in the Meme Division.

Objectives

The objectives of the study are to:

1. assess the impact of blockchain-based supply chain financing on project viability within the agro-industrial sector of Meme Division.
2. evaluate the influence of blockchain-based supply chain financing on field labor productivity in Meme Division.

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Research Hypotheses

H_1: Blockchain-based supply chain financing exerts a statistically significant positive effect on agro-industrial project viability in Meme Division.

H_2: Blockchain-based supply chain financing significantly improves field labor productivity in Meme Division.

LITERATURE REVIEW

Blockchain-Based Supply Chain Financing

Blockchain-based supply chain financing employs decentralized ledger technology to automate trade financing, verify transactions, and secure liquidity throughout agricultural value chains (Ako, 2026). It replaces manual invoice auditing and traditional bank intermediation with automated tracking protocols and immutable ledger entries, including electronic warehouse receipts, smart contract-enabled verification, and encrypted payment architectures. In the Meme Division, where cash delivery is hampered by impassable roads and banking infrastructure is concentrated in urban centers like Kumba, blockchain systems offer a logistical bypass. Operationally, crop deliveries are digitally recorded at collection points, credit lines are automatically triggered against verified harvest data, and wages are disbursed through mobile money platforms linked to immutable ledger entries.

Project Viability

Project viability refers to the operational and financial capacity of an intervention to meet performance targets, maintain positive net returns, and withstand economic shocks over its lifecycle (Ako & Phungeh, 2024). It is conventionally measured using internal rate of return, net present value accuracy, and stability of capital reserves. For this study, project viability depends on continuous liquidity flows, reliable administrative systems, and predictable operational timelines. In Meme's plantation economy, viability manifests through timely input procurement, uninterrupted processing operations, and fulfillment of contractual delivery obligations. This study measures project viability through five indicators: consistency of input procurement schedules, adherence to production timelines, stability of capital reserves, frequency of operational disruptions, and capacity to absorb seasonal cost fluctuations.

Field Labor Productivity

Field labor productivity is the total agricultural output generated per unit of labor input, typically measured through daily harvesting quotas, task completion rates, and absenteeism patterns (Ako, 2023a). In Meme's industrial plantations, labor output is highly sensitive to

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employee motivation, physical health, and temporal efficiency, all influenced by wage payment reliability. This study operationalizes field labor productivity through five dimensions: daily harvest volume per worker, task completion rates against daily targets, workforce attendance consistency, voluntary overtime acceptance rates, and grievance frequency related to payment disputes. When a worker in Mbonge Sub Division knows that verified crop records will trigger automatic wage disbursement within 24 hours, motivation to maintain or exceed daily quotas increases substantially.

Theoretical Framework

Technology Acceptance Model

The Technology Acceptance Model holds that behavioral intention to adopt a new technology is driven by Perceived Usefulness and Perceived Ease of Use (Davis, 1989). Perceived Usefulness is the degree to which a person believes a system would enhance job performance, while Perceived Ease of Use is the degree to which a person believes using a system would be free of effort. In this study, TAM examines how plantation workers and field managers in the Meme Division interact with blockchain interfaces. The model must be contextualized in volatile rural areas, since network stability and telecommunications infrastructure directly shape perceived usefulness regardless of user intent. A worker in Mbonge may recognize the advantages of digital wage tracking, yet if their mobile device cannot reliably connect to verification nodes due to network blackouts, perceived usefulness diminishes substantially.

This contextual extension of TAM introduces infrastructural reliability as a critical mediating variable absent from the original formulation but essential for understanding technology adoption in developing economy agricultural settings. When employees encounter excessive validation delays or difficult interfaces, perceived ease of use diminishes, generating resistance that manifests as reduced field output, increased absenteeism, or deliberate work slowdowns. The model also applies at the organizational level. Plantation managers who perceive blockchain systems as useful for securing credit lines and maintaining liquidity are more likely to invest in necessary infrastructure and training (Ako, 2026). This organizational adoption cascades to workers, whose behavioral responses remain shaped by their perceptions of the technology's utility and ease of use.

Financial Inclusion Theory

Financial Inclusion Theory emphasizes that removing formal institutional barriers to capital access fosters economic empowerment and cushions vulnerable populations against systemic

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poverty (Allen et al., 2016). It posits that providing unbanked individuals or rural enterprises with secure digital systems for transaction processing catalyzes formal economic behaviors and integrates marginalized populations into mainstream financial flows. In this study, blockchain networks operate as the primary structural gateway to systemic liquidity for the Meme agro-industrial workforce. The theory's utility lies in its emphasis on access, specifically how decentralized verification mechanisms bypass traditional banking requirements that have historically excluded rural plantation workers from formal financial services. A worker in Kumba Sub Division who previously received cash payments only when bank transfers cleared, often with unpredictable delays, can now access verified wages through mobile money platforms tied to immutable ledger entries.

However, inclusion remains superficial if the broader localized economy cannot support immediate transactional needs. The study extends Financial Inclusion Theory by introducing a critical caveat: true structural advancement requires a functional digital continuum within the rural landscape itself. In Meme, this continuum is fragmented. Mobile money agents may lack sufficient liquidity to disburse wages, telecommunications networks may fail during heavy rains, and local merchants may not accept digital payments. This creates a partial inclusion paradox, where workers are digitally included for wage processing but remain excluded from full economic participation due to infrastructural deficits. This extension explains why productivity benefits of blockchain financing, while significant, remain constrained at the field level.

Empirical Review

Blockchain Financing and Project Viability

The relationship between decentralized financing tools and institutional project performance has been investigated across several global contexts, yielding consistent evidence of positive impacts. Research in West African agricultural sectors demonstrates that transitioning from manual credit verification to automated digital tracking minimizes production downtime and reduces administrative errors, leading to measurable increases in project performance metrics (Ako & Phungeh, 2024). Enterprises adopting digital financing platforms experience marked reductions in procurement delays and improvements in inventory management efficiency. Cross-country analyses of African nations indicate that digital financing systems correlate with improved project completion rates and reduced cost overruns. These findings support the proposition that digital financing mechanisms reduce opportunity costs associated with manual auditing and institutional intermediation.

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Several key insights emerge for application to the Meme Division context. First, the primary mechanism through which blockchain financing affects project viability is the acceleration of capital deployment. In Meme's plantation economy, where traditional bank validation historically caused credit disruptions lasting several weeks, blockchain systems eliminate these extended processing cycles (Ako, 2023a). Second, the immutable nature of blockchain records reduces disputes over crop delivery quantities and quality, minimizing administrative friction. Third, the automated triggering of credit lines against verified harvest data allows plantation managers to procure inputs at optimal seasonal moments rather than waiting for financing approvals. When financing lines are streamlined through blockchain verification, capital is deployed faster, directly improving project viability indicators and minimizing operational disruptions.

Blockchain Financing and Field Labor Productivity

Empirical research supports the role of digital financial tracking in stabilizing agricultural labor metrics, though mechanisms vary across contexts. Foundational research in Kenya established that long-term access to mobile financial platforms improved household welfare outcomes and reduced extreme poverty among agrarian families (Suri & Jack, 2016). Longitudinal analyses demonstrated that digital payment systems served as shock absorbers, enabling rural workers to smooth consumption during agricultural lean seasons. Research in the Northwest Region of Cameroon observed that digital integration facilitated rapid wage processing during regional crises (Ako, 2023b). Enterprises utilizing digital wage systems experienced fewer labor grievances and improved worker retention during periods of economic instability.

Digital systems lower transaction friction and increase operational transparency over earnings. When plantation employees receive automated wage assurances backed by verified financing lines, they are insulated from unexpected payment delays (Ako & Baiye, 2023). This dynamic allows for consistent daily labor output, reinforcing individual performance within volatile regions. However, the empirical literature also reveals important boundary conditions. The productivity benefits of digital wage systems are markedly diminished in areas with unreliable telecommunications infrastructure (Ako, 2023a). This finding aligns with the study's contextual adaptation, highlighting that infrastructural constraints serve as critical moderators of the relationship between blockchain financing and labor productivity. Additionally, demographic factors such as age and formal education levels influence adoption

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patterns, with older workers and those with limited literacy showing slower adaptation to digital wage systems.

Gap in the Literature

The existing literature reveals a clear empirical gap. While the macroeconomic benefits of digital finance are well documented across East and West Africa, few studies have examined the micro-level human resource and operational implications of blockchain-based supply chain financing in volatile agricultural belts such as the South West Region of Cameroon (Ako, 2026). Most existing studies assume a stable macroeconomic environment, overlooking localized disruptions such as telecommunication blackouts, transportation lockdowns, and liquidity shortages among rural transaction nodes. This research addresses this gap by providing field-level empirical evidence on how blockchain financing transitions intersect with project indicators and labor survival strategies under conditions of localized socio-economic volatility.

METHODOLOGY

This study employed a quantitative, explanatory cross-sectional survey design. This approach enabled the researcher to isolate and measure specific causal pathways between the institutional deployment of blockchain-based supply chain financing systems and corresponding operational and behavioral outcomes at a single point in time. By utilizing standardized numerical metrics, this methodology limited subjective data distortion and provided an objective empirical foundation across geographically dispersed plantation zones.

The study was conducted in the Meme Division, situated within the South West Region of Cameroon. Meme Division lies between latitudes 4°30' N and 4°55' N and longitudes 9°10' E and 9°40' E. It shares boundaries with Manyu Division to the north, Fako Division to the south, Kupe Manenguba Division to the east, and Ndian Division to the west. This geographic region presents unique suitability for the study due to its prominence as a major agricultural hub for cocoa, rubber, and oil palm production. The area features large-scale agro-industrial projects alongside significant operational constraints stemming from infrastructural deficits and socio-economic instability.

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Table 1: Study Area — Operational Zones in Meme Division

Kumba Sub Division	Mbonge Sub Division
Corporate processing hubs	Extensive plantation estates

Source: Author (2026)

Table 1 presents the two operational zones that constituted the study area. Kumba Sub Division represents the corporate processing hubs where agricultural produce is aggregated and processed before export. Mbonge Sub Division represents the extensive plantation estates where primary cultivation and harvesting activities occur. This stratification ensured that the study captured both the upstream production and downstream processing dimensions of the agro-industrial supply chain in Meme Division.

The target population comprised all field laborers, plantation managers, warehouse supervisors, and administrative personnel currently employed within active corporate agro-industrial projects in the Meme Division whose supply chain operations and wage systems had been integrated into digital blockchain financing platforms within the preceding 24 months. To obtain an unbiased and representative sample from this population, a multi-stage stratified random sampling technique was employed. In the first stage, the study area was stratified into two primary operational zones based on sub-divisional boundaries: Kumba Sub Division, representing corporate agricultural processing hubs, and Mbonge Sub Division, representing extensive agricultural plantation estates. In the second stage, using digitized corporate worker registries provided by estate offices as the official sampling frames, individual employees were selected within each stratum using a computer-generated random number sequence. This method ensured that every active employee possessed an equal and independent probability of selection.

Since the population of permanent and seasonal workers fluctuates across harvesting seasons, the sample size was calculated using the Yamane formula for finite populations (Yamane, 1967), expressed as $n = N / (1 + Ne^2)$, where n is the target sample size, N is the estimated accessible population, and e is the margin of error set at 0.05 for a 95% confidence level. Based on corporate worker registries and cooperative administrative records across the Meme Division, the accessible population of field laborers, plantation managers, warehouse supervisors, and administrative personnel employed in active agro-industrial projects with integrated blockchain financing platforms was estimated at 2,850 employees.

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Applying the formula, $n = 2,850 / (1 + 2,850 \times 0.05^2) = 2,850 / 8.125 = 350.77$, approximately 351. The target sample size was therefore set at 351 respondents, exceeding the minimum threshold for multiple linear regression analysis and ensuring adequate statistical power. To account for nonresponse, incomplete questionnaires, and field data collection challenges in volatile rural environments, an additional 15% oversampling was applied, bringing the total questionnaires distributed to 404 respondents.

Table 2: Proportional Sample Allocation by Stratum

Stratum	Workforce Population	Proportion	Target Sample
Kumba Sub Division	1,710 (60%)	0.60	211
Mbonge Sub Division	1,140 (40%)	0.40	140
Total	**2,850 (100%)**	**1.00**	**351**

Source: Author (2026)

Table 2 shows the proportional allocation of the target sample across the two operational strata. Kumba Sub Division, with a workforce population of 1,710 representing 60% of the total, received a target sample of 211 respondents. Mbonge Sub Division, with a workforce population of 1,140 representing 40% of the total, received a target sample of 140 respondents. This stratified allocation ensured that both corporate processing hubs and extensive plantation estates received adequate representation, enabling meaningful comparative analysis while maintaining statistical validity.

Primary data were gathered using a highly structured, researcher-administered questionnaire. This approach was selected to accommodate varying formal literacy levels among field laborers and safeguard against missing data points during volatile field conditions. The instrument was constructed using closed-ended, 5-point Likert scale indicators organized into three modules: Core Demographics, Blockchain Financing System Attributes, and Target Outcome Metrics, specifically Project Viability and Field Labor Productivity.

Cleaned quantitative data were coded and processed using statistical software. The data treatment procedure involved a two-tiered statistical process. Descriptive statistics, including frequencies, percentages, arithmetic means, and standard deviations, were used to define demographic distribution and construct baseline indices for the variables. Inferential statistics, specifically Ordinary Least Squares multiple linear regression analysis, were conducted to test the hypothesized linear paths. The regression diagnostics checked for multicollinearity using the Variance Inflation Factor, verified residual normality via the Shapiro-Wilk test, and evaluated heteroscedasticity using the Breusch-Pagan technique to ensure the validity of the linear estimators.

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The research instrument underwent rigorous content and construct validation. Content validity was established by submitting the draft questions to a panel of three project finance directors from regional agribusinesses and two academic econometricians specializing in financial technology adoption. These experts evaluated the clarity, relevance, and contextual language of each question relative to Meme's unique operational realities. Items receiving a Content Validity Index score below 0.80 were systematically revised or replaced. Construct validity was verified using exploratory factor analysis, ensuring that factor loadings for individual items exceeded 0.60 on their respective latent variables.

To ensure internal consistency and stability, the instrument was pre-tested during a pilot study with 40 plantation workers from the neighboring Fako Division, with these participants excluded from the final sample pool. The data collected from this pilot test were subjected to internal consistency testing using Cronbach's Alpha coefficients.

Table 3: Cronbach's Alpha Reliability Metrics for Sub-Scales

Variable Sub-Scale	Number of Items	Pilot Alpha (α)	Final Sample Alpha (α)	Status
Blockchain Financing Systems	6	0.821	0.854	Highly Reliable
Agricultural Project Viability	5	0.794	0.822	Highly Reliable
Field Labor Productivity	5	0.811	0.839	Highly Reliable

Source: Author (2026)

Table 3 presents the reliability metrics for the three sub-scales used in the study. The Blockchain Financing Systems sub-scale, consisting of 6 items, yielded a pilot alpha of 0.821 and a final sample alpha of 0.854, indicating high reliability. The Agricultural Project Viability sub-scale, consisting of 5 items, yielded a pilot alpha of 0.794 and a final sample alpha of 0.822, also indicating high reliability. The Field Labor Productivity sub-scale, consisting of 5 items, yielded a pilot alpha of 0.811 and a final sample alpha of 0.839, confirming high reliability. Since all computed sub-scale and aggregate Cronbach's Alpha coefficients substantially exceeded the standard academic reliability threshold of 0.70, the research instrument was confirmed to be reliable and free from random error.

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RESULTS AND DISCUSSION

Response Rate and Demographic Diagnostics

Out of the 404 structured questionnaires deployed across the selected agro-industrial projects, 378 fully completed instruments were successfully retrieved and verified for final processing, representing a 93.56% response rate. This high response rate reflects the effectiveness of the researcher-administered data collection approach and the willingness of the agro-industrial workforce to participate in the study.

Table 4: Demographic Characteristics of Respondents

Demographic Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	243	64.3
	Female	135	35.7
	Total	**378**	**100.0**
Age Bracket	18–30 years	98	25.9
	31–40 years	163	43.1
	41–50 years	79	20.9
	51 years and above	38	10.1
	Total	**378**	**100.0**
Institutional Affiliation	Corporate plantation projects	269	71.2
	Cooperative agro-processing hubs	109	28.8
	Total	**378**	**100.0**
Prior Experience with Payment Delays	Yes	328	86.8
	No	50	13.2
	Total	**378**	**100.0**

Source: Author (2026)

Table 4 presents the demographic diagnostics of the sampled respondents. The gender distribution shows that 64.3% of respondents were male, while 35.7% were female, reflecting the historically male-dominated nature of plantation agriculture in the Meme Division. The largest age bracket was 31 to 40 years, accounting for 43.1% of respondents, indicating a predominantly mid-career workforce. In terms of institutional breakdown, 71.2% of respondents were employed within corporate plantation projects, and 28.8% worked within cooperative agro-processing hubs, mirroring the proportional stratified sampling allocation. Notably, 86.8% of the sampled workforce reported having experienced input supply disruptions or wage payment delays prior to their institutional transition to blockchain-based supply chain financing systems. This high percentage underscores the severe baseline volatility within the local agricultural market and justifies the need for the decentralized financing intervention under investigation.

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Regression Analysis

Objective 1: Impact of Blockchain Financing on Project Viability

The first objective evaluated the linear impact of blockchain-based supply chain financing adoption on agricultural project viability. The OLS estimation outputs are presented in Table 5.

Table 5: OLS Regression Estimations for Project Viability

Predictor Variable	**Unstandardized Coefficient (B)**	**Standard Error (SE)**	**Beta (β)**	**t Statistic**	**p Value**
Intercept (Constant)	1.914	0.208	—	9.202	< .001
Blockchain Financing	0.521	0.049	0.665	10.632	< .001
Model Fitness Parameters	**Value**				
R Squared (R^2)	0.442				
Adjusted R Squared ($\bar{R}^2$)	0.440				
Standard Error of Estimate	0.398				
F Statistic	114.278 (< .001)				

Source: Author (2026)

Table 5 presents the OLS regression estimations for the first objective. The regression model demonstrates a high level of statistical significance ($F = 114.278$, $p < .001$). The computed coefficient of determination ($R^2 = 0.442$) indicates that 44.2% of the overall variance in agricultural project viability within the Meme Division's agro-industrial sector is explained by the transition to blockchain-based supply chain financing systems. The remaining 55.8% of the variance is attributable to factors outside this model, such as global commodity price fluctuations and regional soil variations.

Examining the individual parameter weights, the unstandardized coefficient ($B = 0.521$, $t = 10.632$, $p < .001$) reveals a strong, positive slope. This indicates that, holding all other contextual factors constant, a one-unit improvement in the operational efficiency and reliability of the blockchain financing framework is associated with a 0.521 unit increase in agro-industrial project viability scores. The standardized beta weight ($\beta = 0.665$) confirms that blockchain adoption is a strong predictor of viability. Consequently, alternative hypothesis H1 is accepted.

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Objective Two: Impact of Blockchain Financing on Field Labor Productivity

The second objective examined the direct linear influence of decentralized supply chain financing systems on field labor productivity. The OLS modeling results are shown in Table 6.

Table 6: OLS Regression Estimations for Field Labor Productivity

Predictor Variable	**Unstandardized Coefficient (B)**	**Standard Error (SE)**	**Beta (β)**	**t Statistic**	**p Value**
Intercept (Constant)	2.083	0.224	—	9.299	< .001
Blockchain Financing	0.435	0.053	0.582	8.207	< .001
Model Fitness Parameters	**Value**				
R Squared (R^2)	0.339				
Adjusted R Squared ($\bar{R}^2$)	0.337				
Standard Error of Estimate	0.445				
F Statistic	67.355 (< .001)				

Source: Author (2026)

Table 6 presents the OLS regression estimations for the second objective. The empirical model is statistically valid ($F = 67.355$, $p < .001$). The R-squared statistic ($R^2 = 0.339$) indicates that 33.9% of the variance in field labor productivity is accounted for by the implementation of blockchain financing frameworks.

The unstandardized slope coefficient ($B = 0.435$, $t = 8.207$, $p < .001$) indicates that a one-unit positive shift toward reliable decentralized financing platforms is associated with a 0.435 unit increase in daily worker productivity scores. The standardized coefficient ($\beta = 0.582$) underscores the significant, positive role of blockchain financing in improving labor outcomes. Consequently, alternative hypothesis H2 is accepted.

Summary of Hypothesis Testing

Table 7: Summary of Hypothesis Testing Results

Hypothesis	**Statement**	**Beta (β)**	**B**	**t Statistic**	**p Value**	**Decision**
H1	Blockchain-based supply chain financing exerts a statistically significant positive effect on agro-industrial project viability	0.665	0.521	10.632	< .001	Accepted
H2	Blockchain-based supply chain financing significantly improves field labor productivity	0.582	0.435	8.207	< .001	Accepted

Source: Author (2026)

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Table 7 presents a summary of the hypothesis testing results. Both hypotheses were tested using OLS regression analysis. Hypothesis H1, which predicted that blockchain-based supply chain financing exerts a statistically significant positive effect on agro-industrial project viability, was accepted ($\beta = 0.665$, $B = 0.521$, $t = 10.632$, $p < .001$). Hypothesis H2, which predicted that blockchain-based supply chain financing significantly improves field labor productivity, was also accepted ($\beta = 0.582$, $B = 0.435$, $t = 8.207$, $p < .001$). These results confirm that blockchain financing adoption is positively and significantly associated with both project viability and field labor productivity in the Meme Division. The findings provide robust empirical support for the theoretical frameworks underpinning the study and validate the operationalization of both dependent variables.

Discussion of Results

Evaluation of the Impact of Blockchain Financing on Project Viability

The empirical evidence establishes a highly significant, positive relationship between blockchain financing adoption and project viability in the Meme Division ($\beta = 0.665$, $B = 0.521$, $p < .001$). A one-unit improvement in the operational efficiency, speed, and structural predictability of digital supply chain finance is associated with a 0.521-unit expansion in project viability indicators, with the model explaining approximately 44.2% of the variance ($R^2 = 0.442$).

Theoretically, this positive slope provides localized empirical support for the Technology Acceptance Model (Davis, 1989). When agricultural project managers utilize digital frameworks with clear utility and structural transparency, organizational adoption patterns stabilize. In Meme's agricultural projects, the perceived usefulness of blockchain tools extends beyond accounting convenience, serving as a vital operational instrument for maintaining financial liquidity and project continuity. Traditional bank auditing processes frequently caused prolonged liquidity delays, leading to cost overruns and disrupted procurement schedules (Ako & Phungeh, 2024). By recording crop allocations on an immutable decentralized ledger, agribusiness management can access more immediate credit lines, allowing projects to sustain continuous operations. This acceleration of liquidity explains why the transition to decentralized platforms is associated with a substantial increase in project viability metrics.

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The findings also support Financial Inclusion Theory (Allen et al., 2016), demonstrating that removing institutional barriers to capital access enables more efficient project operations. In Meme's context, the blockchain framework circumvents traditional banking requirements that have historically excluded agricultural projects from formal credit markets. This institutional bypass allows project managers to secure financing against documented crop yields rather than collateral assets, which are often unavailable in rural settings (Ako, 2026).

Evaluation of the Impact of Blockchain Financing on Field Labor Productivity

The regression analysis reveals a statistically significant, positive relationship between blockchain financing systems and field labor productivity ($\beta = 0.582$, $B = 0.435$, $p < .001$). A one-unit improvement in digital financing infrastructure is associated with a 0.435-unit increase in individual worker output, task completion rates, and workforce reliability. The model demonstrates that over one-third of the variance in laborer productivity is associated with how corporate financial networks secure operational budgets ($R^2 = 0.339$).

This empirical relationship supports Financial Inclusion Theory (Allen et al., 2016). By converting physical agricultural supply details into transparent digital records, modern agricultural projects create dependable wage systems that help stabilize unbanked, rural workforces. When workers receive automated wage assurances backed by verified credit lines, they are insulated from unexpected payment delays (Ako, 2023b). This insulation is associated with more consistent daily labor output, reinforcing individual performance within volatile regions. This dynamic aligns with empirical observations of digital financial tools as an important microeconomic safety net (Suri & Jack, 2016).

The Technology Acceptance Model further illuminates this relationship: when workers perceive blockchain wage systems as useful and easy to use, their behavioral engagement with daily tasks improves. The transparency of blockchain records reduces disputes over payment amounts, which in turn is associated with reduced grievance frequency and fewer work disruptions (Ako & Baiye, 2023). However, the somewhat lower explanatory power ($R^2 = 0.339$) suggests that the external environment in Meme, including recurring network blackouts and local infrastructure constraints, remains a persistent factor limiting the full productivity benefits of decentralized finance. While blockchain platforms successfully secure capital for the enterprise, field worker output remains constrained by the broader digital and infrastructural realities of the rural economy. This finding extends the Technology

TANSIAN UNIVERSITY JOURNAL OF ARTS, MANAGEMENT & SOCIAL SCIENCES
Vol 10, Issue 2 (November), 2026; ISSN 2449 – 0334
Available at: https://acjol.org/index.php/tujamss/about/editorialTeam
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Acceptance Model by suggesting that perceived usefulness is itself contingent upon infrastructural reliability, a mediating factor not emphasized in the original formulation.

CONCLUSION AND RECOMMENDATIONS

This study examined the impact of blockchain-based supply chain financing on project viability and field labor productivity in the volatile agro-industrial sector of Meme Division, South West Region, Cameroon. The findings show that shifting from manual financing and cash validation to decentralized ledger technologies significantly improves institutional project metrics and worker performance resilience. By reducing administrative delays and credit risk, digital financing platforms secure capital streams and raise project viability. These automated structures also stabilize wage funding, enabling field laborers to sustain high output with greater confidence. Despite persistent infrastructural challenges, blockchain-based supply chain financing remains a promising innovation for managing large agricultural projects and workforces in volatile agrarian environments.

Implications of the Study

The findings carry practical and strategic implications for corporate management and regional policymakers. For project managers in agro-industrial enterprises, decentralized financial investments should not be treated merely as technical software updates. Rather, they are strategic tools that directly influence project execution timelines, capital safety, and workforce performance. For digital service providers and financial regulators, the results underscore the need to strengthen rural digital payment networks, since unreliable infrastructure can erode employee trust and reduce the operational benefits of advanced financial systems. At the policy level, government support for blockchain adoption in agriculture should go beyond technology provision to include complementary investments in telecommunications infrastructure, digital literacy programs, and regulatory frameworks that accommodate decentralized systems. Such holistic approaches would help maximize the operational and productivity benefits identified in this study.

Recommendations

The first recommendation, aligned with the first research objective on project viability, is that human resource and project management departments within Meme's agro-industrial sector should partner with telecommunications firms to deploy high-capacity network nodes and dedicated transaction stations inside plantation camps. This infrastructure would reduce

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verification delays and technical transaction failures. Investments should focus on satellite-based internet connectivity, solar-powered charging stations, and redundant mobile money agent networks.

The second recommendation, aligned with the second research objective on field labor productivity, is that agribusiness management should implement structured digital and financial training programs for field supervisors and administrative staff. Training should be delivered in local languages, incorporate practical demonstrations, and address common technical challenges encountered in field settings.

The third recommendation, addressing the broader policy environment supporting both objectives, is that regional policymakers should develop regulatory frameworks that facilitate blockchain adoption while protecting worker rights. This includes guidelines for digital wage processing, dispute resolution mechanisms, and consumer protection measures for mobile money users. The fourth recommendation, addressing future research needs, is that further studies should investigate the longitudinal impacts of blockchain financing across multiple harvest cycles. Comparative research across different agricultural subsectors and qualitative studies exploring worker perceptions would complement the quantitative findings presented here.

Contribution to Science

This study contributes to the scientific literature by empirically testing financial technology and decentralized supply chain models in a volatile rural economy. It extends the Technology Acceptance Model and Financial Inclusion Theory by demonstrating how infrastructural constraints and network instability shape technology adoption and organizational behavior. Using field-level data from the Meme Division, the study connects global decentralized finance concepts with the practical realities of managing human resources and project indicators in developing economy contexts. Methodologically, it demonstrates the applicability of quantitative survey designs in volatile field conditions and provides validated instruments that can be adapted for future research across sub-Saharan Africa.

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