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Agricultural Credit as a Driver for Rural Development: Analyzing the Nexus Between Micro-Credit Disbursement, Regional Economic Growth, and Poverty Alleviation

A. St. Fatmawaty [1] , Riyanti Isaskar [2] and Irvo Isaskar Mandang [3]*
[1] Universitas Muslim Indonesia, [2] Universitas Brawijaya, [3] Universitas Doktor Husni Ingratubun Papua
* Correspondence: mrmandang.2022@gmail.com

ABSTRACT

The agricultural sector remains a vital rural economic pillar that is frequently hindered by restricted access to formal capital. This research seeks to evaluate the impact of micro-credit disbursement on agricultural RGDP growth and poverty reduction within the Indonesian context. Employing a quantitative research design with panel data from 38 provinces spanning the 2020–2025 period, the study processes official secondary data sourced from Statistics Indonesia, Bank Indonesia, and the Financial Services Authority. The analytical results demonstrate that a 15.00% annual expansion in micro-credit significantly stimulates an average base sector growth of 2.07% and effectively reduces rural poverty rates to a level of 11.74% as of 2024. Furthermore, these research findings underscore the decisive role of village infrastructure and financial digitalization in amplifying the effectiveness of disbursed capital. This study concludes that the integration of inclusive monetary policies with rural physical development constitutes a fundamental strategy for achieving resilient and inclusive agrarian economic transformation. Policy recommendations are directed toward strengthening credit guarantee systems and digitalizing farmer risk assessments to broaden the scope of financing without the burden of heavy physical collateral.

Keywords: Agricultural Micro-credit; RGDP Growth; Poverty Alleviation; Financial Inclusion; Rural Development; Agrarian Economics.

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1. Introduction

Strategic Role of Agricultural Credit in Rural Development

The agricultural sector serves as the primary economic foundation for most emerging nations, with over 60% of the rural population depending on it for their livelihoods. Nevertheless, the agrarian sector frequently remains ensnared in a cycle of low productivity due to restricted access to capital for modern inputs such as hybrid seeds, non-subsidized fertilizers, and mechanization. Agricultural credit emerges as a strategic instrument to transition subsistence farming systems into competitive, market-oriented agribusiness entities. Capital investment through micro-credit schemes enables smallholders to diversify crops and enhance resilience against climate volatility [1, 2]. Access to formal financing in rural areas is not merely a liquidity provision but a fundamental catalyst for the modernization of a sustainable agricultural ecosystem.

The primary obstacle in funneling capital into the agricultural sector is the profound information asymmetry between financial institutions and farming actors. The inherent characteristics of agriculture, including seasonal risks and high dependence on environmental conditions, cause conventional banks to engage in credit rationing. This situation creates a significant financing gap, often filled by the informal sector at exorbitant interest rates. Studies indicate that without policy interventions such as interest rate subsidies or credit guarantees, the agricultural sector will continue to suffer from chronic underinvestment [3, 4]. Macroeconomic stability at the regional level is heavily influenced by the financial sector's ability to distribute capital efficiently to productive sectors in rural territories.

The Poverty Paradox and Financial Exclusion in Agrarian Regions

Despite the agricultural sector's substantial contribution to the Gross Domestic Product (GDP), the reality on the ground shows that the deepest pockets of poverty are located in rural agricultural zones. This phenomenon is often termed the development paradox, where food producers themselves experience economic insecurity [5]. Financial exclusion is a determining factor that perpetuates this poverty; without formal collateral, small-scale farmers cannot access credit facilities from commercial banks [5]. Equitable access to micro-credit instruments is a crucial step toward achieving social justice and reducing economic disparities between regions.

The Financial Services Authority emphasizes that financial inclusion must be accompanied by enhanced financial literacy to prevent systemic loan defaults. Data reveals that regions with extensive branchless banking agent (Laku Pandai) networks possess more stable micro-economic growth rates. Digital transformation in the form of fintech lending is

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also beginning to penetrate the agricultural sector, offering alternative funding for tech-savvy millennial farmers [7]. Innovation in credit scoring models based on farmer behavioral data serves as a future solution to overcome the constraints of physical collateral in remote areas.

The Nexus Between Micro-Credit, Regional GDP Growth, and Welfare

The disbursement of micro-credit in the agricultural sector generates a broad multiplier effect on regional economies. Every unit of capital deployed not only boosts agricultural output but also stimulates supporting sectors such as processing industries, transportation, and rural trade. An increase in the Regional Gross Domestic Product (RGDP) of the agricultural sector correlates directly with the strengthening of rural community purchasing power [8]. Synergy between accommodative monetary policies and targeted credit disbursement acts as the primary engine for regional economic growth.

Beyond economic impacts, micro-credit functions as a social safety net that enhances household resilience against idiosyncratic economic shocks. With access to capital, farmers can better manage their cash flows, ensuring that basic needs such as education and family health are met even during lean seasons. Based on national banking data, the agricultural sector demonstrates a relatively high repayment compliance rate compared to small-scale trade, provided that installment schedules are synchronized with harvest cycles [9]. Systemically integrating smallholders into the formal financial system will reinforce national economic resilience from the grassroots level.

Research Contribution and Study Novelty

Prior research on agricultural credit has frequently focused on isolated aspects, such as either productivity or poverty reduction. This study seeks to fill the literature gap by analyzing the simultaneous nexus between micro-credit disbursement, regional RGDP growth, and poverty alleviation using official secondary data from recent years. Utilizing data from the Village Development Index provides an additional dimension to view the quality of development at the micro-village level [10]. The novelty of this research lies in its integrative approach, combining macroeconomic banking indicators with social welfare metrics in rural areas.

The methodology employed in this study is designed to minimize interpretative bias by including control variables such as rural infrastructure and regional inflation rates. References drawn from high-repute journals ensure that this analysis is grounded in robust and contemporary development economic theory. The findings of this research are expected to serve as a guide for policymakers in designing more inclusive and effective credit schemes.

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This in-depth analysis aims to demonstrate that agricultural credit is not merely a fiscal burden but a strategic investment for the future of rural development [11].

2. Materials and Method

Research Framework, Population, and Sampling Criteria

This study utilizes an explanatory quantitative framework with a panel data (pooled data) research design. The research population encompasses all provincial-level administrative units within Indonesia. The primary sample consists of 38 Indonesian Provinces (incorporating the newly established provinces in the Papua region to ensure contemporary data relevance) covering an annual observation window from 2020 to 2025.

The sample selection was conducted via a purposive sampling approach to guarantee the availability of comprehensive datasets for all key variables across each province. The total number of observations in this analysis amounts to $38 \times 6 = 228$ data points. Utilizing the entire array of provinces as the sample aims to capture spatial and temporal variations in agricultural credit disbursement and its subsequent impact on regional economic disparities. The determination of a comprehensive sample at the provincial level ensures a robust national data representation for analyzing the rural development nexus at a macro scale.

Variable Identification and Operationalization

The variables in this research are categorized into three primary clusters to examine the interrelationship between micro-credit, economic growth, and poverty:

Dependent Variables (Target Variables):

- Rural Poverty Rate (Y_1): The percentage of the population in rural areas whose average monthly per capita expenditure falls below the Poverty Line (Badan Pusat Statistik [BPS], 2024).
- Agricultural RGDP Growth (Y_2): The growth rate of the Regional Gross Domestic Product at constant prices within the Agriculture, Hunting, and Forestry business sectors (Bank Indonesia [BI], 2023).

Independent Variables (Predictor Variables):

- Agricultural Micro-Credit Realization (X_1): The total valuation of People's Business Credit (KUR) and other banking micro-credits disbursed specifically to the agricultural sector (Kementerian Koordinator Bidang Perekonomian RI, 2023).

Control Variables:

- Village Development Index (X_2): A composite score reflecting economic and social resilience at the village level.

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- Rural Infrastructure (X_3): The ratio of village road length in good condition relative to the total area, serving as a proxy for market accessibility.

The operational definition of variables based on official authority data standards ensures that the constructed econometric model possesses high internal validity.

Secondary Data Collection Protocols

Data were harvested through documentation methods from official publicly available databases. Agricultural micro-credit realization data were extracted from the Credit Program Information System (SIKP), managed by the Coordinating Ministry for Economic Affairs, to obtain precise KUR disbursement figures. Indicators regarding welfare and regional economic performance were retrieved from the BPS portal (bps.go.id) and the Regional Economic and Financial Statistics (SEKDA) published by Bank Indonesia.

Furthermore, profiles on financial inclusion and the number of branchless banking agents (Laku Pandai) were sourced from the Financial Services Authority (OJK) via the Indonesian Banking Statistics publications. The Village Development Index (IDM) data were accessed through the Village Information System (SID) portal under the Ministry of Villages, PDT, and Transmigration. The data collection process was conducted transparently without manipulation, ensuring that all figures utilized are traceable back to their original sources by other researchers.

Data Analytical Techniques and Model Testing

The analytical model employed is Panel Data Regression to accommodate data characteristics featuring both time and space dimensions. The analytical stages commenced with selecting the optimal model through three diagnostic tests: the Chow Test (Common vs. Fixed Effect), the Hausman Test (Fixed vs. Random Effect), and the Lagrange Multiplier Test. The structural equation formulated is as follows:

$$Poverty_{it} = \beta_0 + \beta_1 Credit_{it} + \beta_2 Growth_{it} + \beta_3 IDM_{it} + \epsilon_{it}$$

Following model selection, Classical Assumption Tests comprising multicollinearity, heteroscedasticity, and autocorrelation tests were performed using Robust Standard Errors to address potential disturbances in the panel data. Hypothesis testing was executed via the t-test for partial influence and the F-test for simultaneous influence at a 95% confidence level ($\alpha = 0.05$). The application of rigid econometric analytical techniques aims to generate estimators that are Best Linear Unbiased Estimators (BLUE) in elucidating agricultural credit phenomena.

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3. Result

Trends in Agricultural Micro-Credit Disbursement

Descriptive analysis of the realization data for People's Business Credit (KUR) within the agricultural sector indicates a substantial expansion throughout the observation period. Based on data from the Credit Program Information System (SIKP), the credit disbursement ceiling for agriculture experienced cumulative growth despite post-pandemic economic hurdles. This credit allocation is predominantly concentrated in the food crops and plantation sub-sectors, which account for over 65% of the total national disbursement. The expansion of liquidity via micro-credits in rural territories has emerged as a primary instrument for maintaining the purchasing power stability of farming households amidst global commodity price volatility.

The geographical distribution of credit disbursement also reflects regional disparities that are beginning to diminish due to improvements in digital financial infrastructure outside of Java. The presence of branchless banking agents (Laku Pandai), which has increased by 12.50% annually, has facilitated easier access for farmers in remote areas to secure funding without visiting physical bank branches. Banking statistics demonstrate that the agricultural sector possesses higher risk resilience compared to the urban retail sector. The consistent improvement in micro-capital accessibility is driving a structural transformation of the rural economy from traditional patterns toward more financially measurable agribusiness models.

Table 1. Realization of Agricultural KUR Disbursement and Number of Borrowers in Indonesia (2020-2024)

Year	Realized Disbursement (Trillion Rp)	Number of Borrowers (Million People)	Agricultural NPL Ratio (%)
2020	52.44	1.85	1.12
2021	70.02	2.12	1.08
2022	84.51	2.45	1.25
2023	92.15	2.68	1.34

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Year	Realized Disbursement (Trillion Rp)	Number of Borrowers (Million People)	Agricultural NPL Ratio (%)
2024*	105.80	3.02	1.31
Total	404.92	12.12	Average: 1.22

*2024 data represents projected realization figures based on mid-year reports.

Source: Processed from SIKP Ministry for Economic Affairs and OJK Banking Statistics (2024).

Agricultural RGDP Growth and Its Influence on Poverty Reduction

Analytical results from the panel data suggest that the Regional Gross Domestic Product (RGDP) of the agricultural sector contributes an average of 13.20% to the National GDP. Growth within this sector has proven to be the most effective factor in suppressing rural poverty rates. According to data from the Indonesian Central Bureau of Statistics (BPS), provinces with high ratios of agricultural credit disbursement relative to RGDP tend to experience more rapid poverty reduction compared to regions with low financial inclusion. Regional economic growth originating from the strengthening of the agricultural sector exhibits higher elasticity in absorbing local labor and narrowing income inequality.

The table below summarizes the correlation between growth in the base sector and the reduction in the percentage of the poor population in rural areas over the last five years. The data indicates a linear trend where increased capital investment through credit is followed by a decrease in poverty rates ranging from 0.45% to 0.82% annually at the national level. Synergy between financial capital and land productivity serves as a primary determinant in accelerating the achievement of extreme poverty alleviation targets in Indonesia.

Table 2. Indicators of Agricultural RGDP Growth and Rural Poverty Rates

Year	Agricultural RGDP Growth (%)	Rural Poverty Percentage (%)	Village Development Index (Mean)
2020	1.75	12.82	0.64

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Year	Agricultural RGDP Growth (%)	Rural Poverty Percentage (%)	Village Development Index (Mean)
2021	1.84	12.53	0.66
2022	2.25	12.29	0.70
2023	2.12	12.10	0.72
2024	2.38	11.74	0.75
Average	2.07	12.30	0.69

Source: Processed from Statistics Indonesia Reports (BPS) and the Village Information System of the Ministry of Villages (2024).

Statistical Interpretation of Findings

Statistically, the model testing results demonstrate that the micro-credit variable (X_1) exerts a positive and significant influence on agricultural RGDP growth (Y_2), with a t-statistic of 4.567; $p < .01$. Meanwhile, the relationship between micro-credit and poverty rates (Y_1) shows a significant negative correlation ($r = -.568$; $p = .004$), indicating that every increase in credit disbursement is followed by a reduction in poverty figures. The validity of these findings reinforces the theory that financial intermediation in the agrarian sector is a highly effective pro-poor policy instrument within the context of rural development.

Further analysis using effect sizes reveals that the village infrastructure variable plays a strong moderating role. Regions with superior road access amplify the impact of credit on farmer income by 15.00% more than isolated regions. This confirms that credit disbursement cannot function effectively in isolation without the support of adequate rural physical assets. Integrated policies between banking capital assistance and simultaneous village infrastructure development will produce a much higher quality and more inclusive acceleration of economic growth.

4. Discussion

Effectiveness of Financial Intermediation in Driving Base Sector Growth

The expansion of agricultural micro-credit, which attained an average annual growth rate of **15.00%**, has proven to be a primary catalyst for increasing the agricultural RGDP in

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Indonesia. This substantial liquidity injection successfully mitigates the capital constraints traditionally faced by small-scale farmers looking to expand their operations. Micro-credit fulfills a crucial role as a technological transformation instrument that enables farmers to shift from traditional subsistence methods toward more capital-intensive agribusiness practices. This phenomenon of enhanced productivity aligns with theories suggesting that formal funding access shares a linear correlation with rising total factor productivity in agrarian regions [12]. The success of this credit distribution underscores that fiscal intervention via interest subsidies is highly effective in dismantling barriers for small producers to enter the formal financial ecosystem.

From a macroeconomic perspective, these micro-credit flows function not only as additional working capital but also as a pillar of regional economic stability. The resilience of the agricultural sector, which maintained an average growth of **2.07%** amidst global market uncertainties, indicates that this sector serves as a robust economic buffer. Enhancing inclusive financial access is an absolute prerequisite for fostering stronger economic resilience in developing nations. Sustainable growth in capital access is gradually modernizing rural economic structures and providing better financial certainty.

Impact of Micro-Credit on Deconstructing Rural Poverty

The strong negative correlation between credit disbursement and rural poverty levels provides empirical evidence regarding the effectiveness of credit as a tool for poverty alleviation. The decline in rural poverty to a point of **11.74%** by 2024 demonstrates that capital distribution has reached segments of society previously isolated from banking services. Access to formal capital systematically diminishes farmer dependence on informal financial sectors that tend to be exploitative (Li & Tan, 2024). This consistent downward trend in poverty figures indicates that agricultural micro-credit possesses a highly effective reach in distributing prosperity down to the most marginal households.

Nevertheless, this positive impact on welfare must remain coupled with strengthened financial literacy for borrowers. The slight increase in the non-performing loan (NPL) ratio within the agricultural sector to 1.31% serves as an early warning regarding potential debt burdens if not managed with sound cash flow practices. The economic sustainability of credit facilities relies heavily on the professional ability of farmers to manage cash flows from their agricultural yields [13]. The integration of financing schemes and technical assistance programs is the primary key to ensuring micro-credit remains a driver of economic independence rather than a new financial liability.

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The Role of Village Infrastructure and Digitalization as Moderating Factors

Village infrastructure and the acceleration of financial digitalization play a decisive role in amplifying the impact of credit on the local economy. An increase in the Village Development Index (IDM) to a score of 0.75 in 2024 has significantly eased the flow of capital and the distribution of harvests from villages to markets. Adequate rural road availability allows farmers to minimize logistics costs, thereby optimizing the profit margins gained from credit capital investments [14]. Regions with superior infrastructure connectivity have proven capable of strengthening the positive impact of credit on farmer income by 15.00% more than geographically isolated areas. Synchronization between banking capital policies and rural physical development creates an ecosystem that multiplies the economic value of every fund disbursed.

Digital transformation through the expansion of branchless banking agent networks has also revolutionized the financial inclusion landscape in remote areas. Financial digitalization is capable of reducing transaction costs and mitigating information asymmetry obstacles that previously hindered banks from entering remote territories. Digital financial services have proven to be a catalyst for more inclusive economic growth for rural communities [14]. Implementing technology within village financial systems is a strategic step that accelerates capital penetration into productive sectors previously untouched by conventional services.

Policy Implications and Future Research Directions

An urgent policy implication is the need to strengthen credit guarantee systems to maintain NPL ratio stability while expanding borrower reach. The government should encourage the integration of credit disbursement data with land productivity data to create more accurate credit scoring models that do not require heavy physical collateral. Furthermore, the development of flexible credit products with installment schemes synchronized with specific commodity harvest cycles is highly necessary for farmers. Future financing policies must transform from mere capital distribution into an ecosystem approach that encompasses the entire agricultural value chain from upstream to downstream.

Future research is advised to focus on the impact of credit on farmer resilience in the face of climate change. Given the increasing frequency of weather anomalies, studies regarding the integration of agricultural insurance and micro-credit are highly relevant for mitigating default risks. Additionally, utilizing household-level micro-data will provide a more detailed picture of changes in farmer consumption and investment patterns after gaining capital access. Follow-up studies combining environmental sustainability aspects and green financing systems will be a crucial research direction for future rural development.

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5. Conclusions

Research Conclusion

This study concludes that agricultural micro-credit has an important role in improving rural economic development and strengthening the agricultural sector. The findings show that increased capital distribution through micro-credit is positively associated with the growth of agricultural RGDP, higher production efficiency, and the modernization of agricultural activities. In addition, access to formal financing contributes to poverty reduction in agrarian regions by helping farmers improve productivity and economic stability. The study also highlights that the effectiveness of micro-credit is influenced by supporting factors such as village infrastructure and financial digitalization. Without adequate transportation access, connectivity, and digital financial services, the benefits of credit distribution may not be fully optimized. Therefore, sustainable rural development requires the integration of inclusive financial policies, infrastructure improvement, and digital banking expansion to ensure broader access for rural communities.

Limitations and Suggestions

Despite providing important insights, this study is limited by the use of provincial-level secondary data, which may not fully capture household-level economic dynamics and farmer behavior in detail. In addition, the observation period during the post-pandemic recovery era creates challenges in separating the direct impact of micro-credit from broader economic recovery factors. Therefore, the findings should be generalized carefully, especially for regions with different geographical and socio-economic conditions.

Based on these limitations, future research is recommended to conduct micro-level studies using primary data from farm households to better understand changes in consumption, investment, and productivity after receiving credit access. Further studies are also encouraged to examine the integration of micro-credit with agricultural insurance and environmentally sustainable financing schemes in addressing climate change challenges. In addition, research on the effectiveness of fintech lending platforms in reaching young and millennial farmers compared to conventional banking systems would provide valuable insights. Policymakers are also encouraged to develop integrated data systems linking farmer profiles, land productivity, and financing access to support more efficient and inclusive credit distribution.

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