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Evaluation of the Impact of UD AMB'S Capital Loan Program on the Economic Well Being of Communities in Silakkidir Village

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Abstract

This study aims to analyze the influence of capital loans provided by UD AMB on the improvement of community income in Silakkidir Village, Hutabayu Raja District. The research employs a quantitative approach using primary data in the form of time-series information obtained from the recipients of capital loans as the research sample. Data analysis was conducted using SPSS version 29 through a series of procedures, including data quality testing, normality testing, simple linear regression analysis, and hypothesis testing. The results indicate that the Capital Loan variable (X) has a significant effect on Community Income, as evidenced by a significance value of $0.001 < \alpha\ 0.05$.

Furthermore, the adjusted coefficient of determination (Adjusted R^2) of 0.998 shows that 99.8% of the variation in Community Income is influenced by Capital Loans, while the remaining 0.2% is affected by other factors outside the model. Based on these findings, it is recommended to enhance access to and the quality of capital loans, strengthen business mentoring and training programs, evaluate the existing loan system, and develop synergistic programs to sustainably improve community income in Silakkidir Village.

1. Introduction

Agricultural development in Indonesia continues to rely heavily on on-farm activities, making productivity strongly dependent on biogeographical factors such as soil quality, rainfall patterns, and climate stability. This dependency underscores the critical need for adequate production facilities, modern technology, and post harvest infrastructure to maintain sustainable agricultural performance. Although Indonesia is recognized as a megabiodiversity country with vast agroecological potential, efforts to enhance agricultural productivity remain constrained by structural limitations, including restricted access to capital, low levels of technological adoption, extreme weather events, unequal land distribution, and suboptimal human resource capacity. These challenges are consistent with the findings of Sinyolo and Mudhara (2021) [25], who demonstrate that smallholder farmers in developing countries are often trapped in an "agrarian poverty cycle" due to limited capital and inadequate access to technology. Similarly, Asfaw et al. (2020) emphasize that financial constraints are among the key factors reducing farm efficiency in many developing agricultural systems.

To address these persistent challenges, the Indonesian government through the National Long-Term Development Plan (RPJPN 2005–2025) and the Agricultural Agribusiness Development Program (PUAP) has prioritized the provision of capital support, technical training, and institutional strengthening to improve farmers' welfare. These national initiatives align with the insights of Ahsan and Jiang (2020) [2] and Li et al. (2021) [16], who assert that improvements in farmers' capacity through capital support and technological innovation are essential determinants of agricultural productivity growth. Nevertheless, access to capital remains a significant barrier for Indonesian farmers. Many farmers rely on personal funds or borrow from informal lenders with high interest rates, which increases their vulnerability, particularly during crop failures. Studies by Banerjee et al. (2021) [9], Mpuga (2021) [20], and Ogutu et al. (2020) [22] confirm that informal loans can exacerbate farmers' economic hardship when not accompanied by adequate financial management.

Additionally, access to formal agricultural credit from banking institutions remains limited due to stringent collateral requirements, insufficient credit allocation for the agricultural sector, and high production risks that make the sector less attractive for financial institutions. Research by Kansiime and Mastenbroek (2022) [13], Hasan et al. (2023) [11], and Baiyegunhi

et al. (2021) highlights structural barriers such as creditworthiness assessments and high transaction costs, which further restrict smallholder farmers from obtaining formal financing.

Silakkidir Village in Simalungun Regency exemplifies these constraints. Despite its considerable agricultural potential, the village faces significant limitations in working capital. The emergence of UD AMB as a local provider of capital loans serves as an alternative financing mechanism that supports farmers' production needs. However, the effectiveness of UD AMB's loan program in improving farmers' income has not yet been empirically examined. International studies such as Kumar *et al.* (2021) [15], Attah *et al.* (2020) [6], and Razaq *et al.* (2022) [24] consistently show that targeted productive credit can enhance household income, promote farm diversification, and stimulate rural economic activities. In contrast, other studies including Yang *et al.* (2022), Jote (2021) [12], and Gichuki *et al.* (2021) [10] warn that the effectiveness of credit interventions is heavily influenced by financial literacy, capital management skills, extension support, and commodity price stability.

Moreover, several scholars underscore the importance of local socioeconomic contexts in shaping the impact of capital loans on household income. Alkire *et al.*, 2021 [3] and Mekonnen *et al.* (2022), for instance, highlight that household characteristics, entrepreneurial capacity, and market access play crucial roles in determining the effectiveness of credit utilization. Consequently, understanding UD AMB's loan distribution mechanisms, the characteristics of loan recipients, and the ways in which borrowed capital is managed becomes essential to evaluating its influence on household income.

Against this backdrop, this study aims to analyze the extent to which capital loans provided by UD AMB significantly affect farmers' income in Silakkidir Village. The research further examines the socioeconomic profile of loan recipients, the institutional mechanisms governing the loan process, and key success factors in capital utilization. This study contributes to a deeper understanding of how local financing schemes influence rural income enhancement and offers insights for designing more inclusive and sustainable village-level agricultural financing models.

Despite the abundance of international literature on agricultural finance, most studies focus on African and South Asian contexts, limiting their relevance to rural Indonesia. Furthermore, prior research has predominantly examined formal financial institutions, such as banks, cooperatives, or government credit programs, whereas many Indonesian farmers rely on informal local lenders like UD AMB, whose operational mechanisms differ substantially. International research has also tended to emphasize agricultural productivity rather than the direct relationship between capital loans and farmers' income. Additionally, important variables such as financial literacy, capital management skills, and local socioeconomic conditions have been insufficiently incorporated into analyses of credit's impact on household welfare. The absence of prior empirical evaluations of UD AMB's loan program in Silakkidir Village reveals a critical knowledge gap regarding the role of local financing mechanisms in improving rural livelihoods. Thus, this study is essential for filling this gap through an empirical investigation grounded in the local agrarian context.

2. Literature Review
2.1 Agriculture as a Pillar of the Economy in Developing Countries
Agriculture constitutes a foundational sector within the economic structure of Indonesia. With more than 40 percent of the population relying on it as their primary source of livelihood, the agricultural sector plays a multidimensional role not only as a provider of food, but also as a driver of local economic activity, a stabilizing force for rural social systems, and an essential pillar of national food security. This strategic importance is particularly evident in developing countries, where agriculture serves simultaneously as an engine of growth and a social safety buffer for low-income households, especially when industrial and commercial sectors experience periods of stagnation (Ogutu *et al.*, 2020) [22]. Its contribution to sustaining rural household income makes agriculture indispensable in efforts toward poverty alleviation and equitable development.

Despite its central role, the agricultural sector in Indonesia continues to face a complex array of structural challenges. A substantial body of research highlights that most smallholder farmers operate under severe constraints related to resources and accessibility. Sinyolo and Mudhara (2021) [25] demonstrate that smallholders frequently struggle with limited access to working capital, restricted availability of productive inputs such as quality seeds and fertilizers, and low technological literacy. These barriers inhibit agricultural intensification and compel farmers to maintain traditional low input, low output farming systems, resulting in stagnant productivity and heightened vulnerability to multidimensional poverty. Moreover, this dependence on increasingly degraded natural resources exacerbates their economic instability.

From an ecological standpoint, agricultural production is further compromised by increasing climatic unpredictability. Variations in rainfall patterns, shifting planting seasons, hydrometeorological hazards, and declining soil fertility contribute to significant uncertainty in both production outcomes and household income. Zhang *et al.* (2021) identify climate variability as a principal factor driving fluctuations in crop yields and household earnings, particularly among smallholders who lack adaptive capacities such as modern irrigation systems, climate-resilient seed varieties, or adequate post harvest storage. Supporting these findings, Li *et al.* (2021) [16] and (Alkire *et al.*, 2021) [3] highlight that farmers' resilience to climatic risks is closely tied to their economic capacity, access to financing, and ability to adopt sustainable agricultural technologies.

These environmental pressures interact with institutional deficiencies that further constrain Indonesian farmers. In many rural areas, farmers lack access to efficient input markets, farmer-oriented financial institutions, and adequate extension services (Kansiime & Mastenbroek, 2022) [13]. Mekonnen *et al.* (2022) argue that agricultural efficiency is significantly influenced by institutional support, particularly regarding credit access, technical training, and supply-chain governance.

Among the various barriers confronting farmers, limited access to capital is among the most fundamental. Asfaw *et al.* (2020) found that farmers experiencing credit constraints exhibit markedly lower productivity compared to those with

access to financial services. Without adequate capital, farmers tend to minimize input use, delay production activities, or rely on non adaptive farming practices. This is consistent with the findings of Kumar *et al.* (2021) [15], who show that access to productive credit can increase farm household income by up to 25 percent when allocated toward strengthening agricultural inputs and diversifying economic activities.

In addition to capital constraints, socioeconomic factors such as financial literacy, business management capacity, and market linkages also shape the effectiveness of credit utilization. Gichuki *et al.* (2021) [10] and Yang *et al.* (2022) demonstrate that low financial literacy contributes significantly to mismanagement of loan funds, suboptimal use of credit, and heightened risks of loan default.

In the Indonesian context, many farmers continue to rely on informal financial institutions rather than formal banking services. Administrative barriers, stringent collateral requirements, and limited understanding of banking procedures significantly hinder their access to formal credit (Hasan *et al.*, 2023) [11]. As a result, farmers often seek loans from informal lenders, such as village financiers, middlemen, local cooperatives, or community based institutions such as UD AMB. Razaq *et al.* (2022) [24] emphasize that informal financing systems play a vital role in sustaining agricultural production, particularly when formal credit fails to reach vulnerable populations.

However, informal systems are not without limitations. Banerjee *et al.* (2021) [9] caution that informal lending often imposes high interest rates and repayment mechanisms that do not adequately protect farmers from production risks, including the possibility of crop failure. Consequently, examining the effectiveness of informal financing institutions such as UD AMB is essential for understanding their impact on farmers' income and overall household welfare.

2.2 Sustainable Agricultural Development and Modernization

The concept of sustainable agricultural development has evolved far beyond the traditional focus on land intensification and extensification. It now reflects an integrated development framework that prioritizes synergy among technological innovation, efficient market access, and inclusive financial support. This shift responds to the growing need to enhance productivity, reduce production costs, strengthen food security, and safeguard environmental sustainability. Within this modern paradigm, the success of agricultural development is shaped not only by the adoption of advanced agricultural technologies but also by broader socioeconomic factors, including capital capacity, entrepreneurial literacy, market structure, and the strength of village-level institutional systems. Li *et al.* (2021) [16] argue that the modernization of agricultural machinery, digital innovation, and the integration of environmentally friendly technologies significantly increase production efficiency and reinforce food system resilience across Asia.

Despite its conceptual advancements, the implementation of modern agricultural development continues to face substantial structural obstacles. A critical challenge is the low adoption rate of digital technologies or precision farming among smallholder farmers. Precision agriculture which involves the use of sensors, drones, Internet of Things (IoT) devices, GIS based mapping, and artificial intelligence

remains limited due to high initial investment costs and inadequate digital literacy. Zhang *et al.* (2021) identify this technological adoption gap between large-scale and small scale farmers as a primary source of productivity disparities in developing countries.

Limited access to financing also presents a major barrier to the adoption of innovative productive inputs. Capital is essential for investing in improved seed varieties, water efficient irrigation systems, and modern agricultural machinery. However, restricted access to formal credit prevents many smallholders from adopting such innovations. Asfaw *et al.* (2020) found that credit constraints reduce the likelihood of adopting sustainable agricultural technologies by more than 40 percent. Complementing this, Kansiime and Mastenbroek (2022) [13] highlight that administrative barriers, stringent collateral requirements, and the perceived high risk of the agricultural sector discourage formal financial institutions from providing loans to small scale farmers.

Furthermore, limited adaptive capacity to climate related risks is a significant impediment to modern agricultural transformation. Increasing climate variability, unpredictable rainfall, and the growing frequency of hydrometeorological disasters require farmers to possess adaptive capital, such as water-saving technologies, drought tolerant varieties, or adequate storage systems. Ogutu *et al.* (2020) [22] and (Alkire *et al.*, 2021) [3] emphasize that climate risk is a major driver of income vulnerability among smallholder farmers, especially those without adaptation tools or access to agricultural insurance.

Inequitable access to key production resources such as land, irrigation water, input markets, and output markets further undermines agricultural modernization. Mekonnen *et al.* (2022) assert that agricultural productivity is highly dependent on equitable access to these resources. When resource distribution is unequal, smallholders become trapped in cycles of dependency and remain unable to compete with large scale commercial operations. These inequalities are exacerbated by weak agricultural institutions, including extension services, farmer groups, and village cooperatives, which ideally should facilitate coordination, education, and market integration.

Village-level institutional capacity plays an equally critical role. Gichuki *et al.* (2021) [10] show that financial literacy and agricultural business management skills are central to the effective utilization of both formal and informal capital. Similarly, research by Yang *et al.* (2022) demonstrates that strengthening local institutions such as farmer associations and community based financing mechanisms enhances farmers' resilience to climate variability, market risks, and price volatility.

Overall, sustainable and modern agricultural development requires integrated and systemic support involving technology, capital, institutional strengthening, and fair market access. However, as stressed by Mekonnen *et al.* (2022), the primary determinant of innovation adoption is the economic capacity of farm households. Without adequate capital, farmers are unable to access modern inputs, adopt new technologies, or expand their market linkages. Therefore, in the Indonesian context, inclusive financing schemes, strengthened financial literacy, and reinforced village level institutions must be prioritized to accelerate the transformation of agriculture toward a more modern, resilient, and sustainable system.

2.3 The Concept of Capital in Agriculture

The concept of capital occupies a central position in classical economic theory as one of the fundamental factors of production that determines output capacity, production efficiency, and the long-term sustainability of economic activities. Capital is understood not merely as a financial asset but as a broad set of resources that directly or indirectly contribute to enhancing productivity. Within this framework, capital can be classified into several key categories: fixed capital, such as tractors, land, processing machinery, and agricultural infrastructure; working capital, which includes seeds, fertilizers, pesticides, and labor; financial capital, comprising cash, savings, and access to credit; and human capital, which encompasses skills, education, experience, financial literacy, and technical agricultural knowledge. Meltzer (2020) [19] asserts that both human capital and fixed capital are principal determinants of long term productivity growth, since they enable technological adoption, enhance input efficiency, and strengthen production capacity. This comprehensive categorization is crucial, as each type of capital contributes uniquely to agricultural production, and the absence of any form can lead to overall suboptimal performance.

In farming systems, access to capital is a decisive factor influencing farmers' ability to manage and expand their agricultural enterprises. Adequate capital allows farmers to purchase high quality inputs, increase the scale of production, adopt modern technologies, and diversify income sources through non farm activities or value added agricultural products. Capital availability also plays a critical role in reducing the risk of crop failure through the adoption of adaptive technologies, such as water efficient irrigation systems or climate resilient seed varieties. However, numerous studies indicate that limited access to capital remains one of the most significant constraints hindering agricultural productivity in developing countries. Asfaw et al. (2020) demonstrate that credit constraints are a major driver of low productivity and inefficiency among smallholders, as insufficient capital forces them to rely on low quality inputs, reduce fertilization frequency, or delay essential production activities. Supporting this finding, Baiyegunhi et al. (2021) report that access to credit positively influences farmers' adoption of improved seed varieties and sustainable cultivation practices.

Insufficient capital also restricts farmers' ability to adopt new technologies an essential driver of higher yields and improved efficiency. Li et al. (2021) [16] note that the adoption of precision farming technologies, modern machinery, and innovative inputs requires substantial initial investment, which is often beyond the financial capacity of smallholder farmers. Moreover, Mekonnen et al. (2022) highlight that capital constraints not only affect production practices but also limit farmers' access to profitable markets, resulting in persistent stagnation in rural household income. Financial literacy, as an integral component of human capital, further influences the effective management of capital. Gichuki et al. (2021) [10] emphasize that farmers with low financial literacy are more prone to mismanaging loans and experiencing repayment difficulties, which hinders productivity improvements despite access to credit. Collectively, these findings underscore the vital role of capital in all its forms in shaping modern agricultural systems. When access to capital is limited, farmers struggle to increase productivity, expand their enterprises, or manage agricultural risks effectively. This highlights why agricultural financing remains one of the most critical issues in sustainable agricultural development. Ensuring that agriculture continues to function as a productive, efficient, and adaptive sector requires inclusive financing schemes, strong financial literacy programs, and institutional support systems capable of expanding capital access for smallholder farmers.

2.4 Capital Loans and Their Impact on Farmers' Income

The concept of capital lending in the agricultural sector has become a pivotal instrument for enhancing productivity and improving the welfare of farming households, particularly in developing countries. Capital loans provide farmers with access to critical resources that are typically unattainable due to financial limitations such as high-quality seeds, improved fertilizers, mechanized equipment, environmentally friendly technologies, and working capital for expanding cultivated land. A substantial body of empirical research has demonstrated a strong association between access to capital and improvements in agricultural productivity. Kumar et al. (2021) [15], for example, reveal that farmers with access to productive credit experience income increases of 20–25% by investing in higher-quality inputs and reducing reliance on inefficient traditional farming methods. Likewise, Attah et al. (2020) [6] show that increased access to capital not only enhances farm productivity but also stimulates diversification and entrepreneurial activities in rural communities, thereby stabilizing household income and reducing dependence on single crop harvests.

Beyond productivity gains, capital loans also play a crucial role in broadening farmers' economic opportunities. Many smallholders in developing economies face significant barriers in entering agricultural value chains or adopting innovative production technologies. Razaq et al. (2022) [24] demonstrate that access to financing facilitates farmers' participation in modern, competitive input and output markets. Furthermore, capital availability enables the adoption of climate-resilient technologies such as drought-tolerant seed varieties and water efficient irrigation systems which ultimately strengthen agricultural resilience in the face of increasing environmental risks.

However, the effectiveness of capital loans is shaped not only by the amount of credit provided but also by the mechanisms through which loans are delivered, the quality of extension services, and farmers' capacity to manage borrowed funds. Financing schemes that fail to account for farmers' socioeconomic conditions often result in suboptimal capital utilization and may increase the likelihood of loan default. Yang et al. (2022) underscore that loans distributed without accompanying technical support or financial education commonly lead to misallocation of funds, particularly among farmers with low financial literacy. Similarly, Jote (2021) [12] finds that farmers with limited financial literacy are more likely to use loans for short-term consumption rather than for productive investments, thereby diminishing the long-term income benefits typically associated with capital lending.

Several key factors therefore determine the success of capital loans. First, the loan size must be sufficiently large to enable meaningful productive investments; loans that are too small often fail to generate substantial productivity improvements. Second, interest rates must remain affordable

so as not to impose excessive repayment burdens, especially given the inherent volatility of agricultural yields. Third, repayment schedules should reflect the seasonal characteristics of agricultural production cycles. Fourth, adequate extension support is essential to ensure that farmers are equipped with the knowledge required for effective capital management. Fifth, financial literacy plays a fundamental role in enabling farmers to manage risks, plan business activities, and allocate loan funds efficiently. Sixth, farmers' financial management skills including basic record-keeping greatly influence the effectiveness of loan utilization. Seventh, climate-related risks such as rainfall unpredictability, droughts, and pest outbreaks significantly affect farmers' repayment capacity and the extent to which capital investments translate into increased income.

A growing body of international research underscores the critical role of training and financial education in maximizing the effectiveness of capital loans. Gichuki *et al.* (2021) [10] demonstrate that financial literacy has a significant positive effect on credit utilization decisions and loan repayment performance. Likewise, Mekonnen *et al.* (2022) find that the provision of technical training alongside credit increases the likelihood of adopting agricultural innovations by up to 30%. Collectively, these studies affirm that access to capital alone is insufficient; rather, effective credit utilization requires complementary knowledge, robust risk-management capabilities, and strong local institutional support to generate meaningful improvements in farmers' income. Accordingly, a deeper understanding of loan delivery mechanisms and their determinants is essential for developing agricultural financing strategies that are effective, inclusive, and sustainable.

2.5 Supporting Theories for the Study

The supporting theories in this study provide a critical conceptual foundation for understanding the relationship between capital loans, agricultural productivity, and farmers' income within the broader context of agricultural development in developing countries. Capital Theory posits that capital is a fundamental factor of production that directly influences output capacity, operational efficiency, and long-term sustainability. In both classical and contemporary economic perspectives, capital extends beyond financial assets to include physical capital, human capital, and social capital, all of which contribute significantly to productivity enhancement. Meltzer (2020) [19] argues that the availability of additional capital increases farmers' ability to acquire high-quality inputs, adopt new technologies, and expand production scale, thereby generating direct improvements in agricultural output. Complementing this view, Zhang *et al.* (2021) demonstrate that farmers with better access to capital are more likely to adopt precision agriculture innovations, which substantially the efficiency of water, fertilizer, and labor usage. Thus, Capital Theory provides a robust theoretical justification for considering financial support through formal or informal credit as a crucial instrument in strengthening agricultural productivity and promoting sustainable farming systems.

In addition, Household Income Theory emphasizes that household income is shaped by access to resources, the capacity to utilize capital effectively, and the diversification of economic activities. For farming households, income may originate from on-farm production, non-farm employment, seasonal labor, and access to productive credit. Alkire *et al.*,

2021 [3] contend that increased access to capital not only enhances income derived from core agricultural activities but also stimulates household economic diversification, reducing vulnerability to crop failure and price volatility. Attah *et al.* (2020) [6] further reveal that access to microcredit enables rural households to expand their income through secondary enterprises, value-added processing, and informal trading activities. Financial literacy and managerial competence also play central roles within this theoretical framework. Gichuki *et al.* (2021) [10] demonstrate that households with higher financial literacy are more capable of utilizing capital productively and exhibit a lower likelihood of loan default. Accordingly, Household Income Theory provides an analytical lens for understanding how capital affects farmers' income through pathways of productivity enhancement, economic diversification, and improved risk management.

Furthermore, Agricultural Development Theory offers a macro-level perspective by asserting that agricultural development is contingent upon the synergy between capital, technology, institutions, and human capital. Li *et al.* (2021) [16] argue that modern agricultural development requires structural transformation through the adoption of innovative technologies, improved access to financial services, and strengthened institutional capacity at the village level such as farmer groups and agribusiness cooperatives. This theory highlights that the success of agricultural development is not determined solely by the provision of production inputs, but also by the systemic integration of complementary support components. Mekonnen *et al.* (2022) observe that technological innovations are difficult to adopt without sufficient capital, while capital itself yields limited benefits in the absence of adequate education, training, and technical extension services. Additionally, Kansiime and Mastenbroek (2022) [13] emphasize that access to input markets, output markets, and inclusive financial institutions constitutes a core determinant of agricultural development outcomes in developing countries. Thus, Agricultural Development Theory underscores that capital loans represent only one element within a broader, interconnected agricultural development system.

Taken together, these three theories form a coherent and comprehensive conceptual framework, suggesting that improvements in farmers' income through capital loans depend not only on the amount of capital received but also on household capacity, institutional support, technological availability, and the structural conditions of the agricultural sector. Accordingly, this study positions capital as the primary variable affecting farmers' income, supported by Household Income Theory and Agricultural Development Theory to provide a holistic theoretical grounding for the analysis.

3. Methodology

3.1 Population and Sample

The population in this study refers to all individuals who constitute the target of analysis and share specific characteristics relevant to the research objectives. In this context, the population comprises all clients of Usaha Dagang Ambarita (UD AMB) residing in Silakkidir Village, Hutabayu Raja District. Based on administrative data obtained from UD AMB, the total number of active clients receiving capital loan facilities is 30 individuals. The

determination of this population is grounded in methodological considerations, as these individuals are directly involved in the financing program provided by UD AMB and therefore possess firsthand experience, interactions, and observable impacts related to the key research variable, namely the influence of capital loans on community income enhancement.

The selection of this population is also aligned with the principle of target population relevance, which emphasizes that research subjects must accurately represent the information sources necessary to address the research problem comprehensively. Prior studies on the effectiveness of microfinance programs indicate that populations directly receiving financing interventions such as microcredit or working capital loans are the most appropriate groups for analysis, as they experience real changes in income and economic conditions resulting from improved access to capital (Razaq *et al*., 2022; Attah *et al*., 2020) [24, 6].

The sampling technique employed in this study is the Saturated Sample or Census Method, whereby all members of the population are included as research respondents. The use of a saturated sample is supported by several methodological justifications. First, the population size is relatively small only 30 individuals making it operationally feasible and analytically manageable to include all members as respondents. In studies with limited population sizes, methodological scholars widely recommend the saturated sampling approach to minimize selection bias and improve the accuracy of research findings (Sugiyono, 2019). Second, all population members are beneficiaries of the capital loan program, and including the entire population ensures a more comprehensive, in depth, and representative understanding of UD AMB's financing impact on community income. Third, this technique maximizes statistical power, as the analysis incorporates the complete population data without reduction.

Therefore, the decision to adopt the saturated sampling technique is based not only on the relatively small population size but also on sound scientific considerations regarding subject relevance, alignment with research objectives, and the need to produce accurate and valid findings on the effect of capital loans on the income of residents in Silakkidir Village.

3.2 Data Collection Techniques
Primary data in this study were obtained using a survey-based data collection technique through the administration of structured questionnaires. The questionnaire instrument was designed as a series of structured statements intended to measure respondents' perceptions regarding the influence of capital loans on their income. The questionnaires were distributed directly to all research participants, namely clients of Usaha Dagang Ambarita (UD AMB) in Silakkidir Village, Hutabayu Raja District, Simalungun Regency.

The questionnaire employed a Likert Scale as the primary measurement tool, in which each statement was accompanied by five response options: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree.

This scale was chosen because it effectively captures varying levels of respondent agreement and facilitates the quantification of perceptions for statistical analysis. In addition, several questionnaire items were presented in the form of multiple-choice questions and checklist tables to provide respondents with clearer, more objective, and more structured response options.

The questionnaires were administered directly through field surveys to ensure a high response rate and to allow the researcher to provide clarification when respondents encountered items that were difficult to understand. This approach was selected to obtain accurate, valid, and contextually grounded data that reflect the real conditions of UD AMB clients who serve as the research subjects.

3.3 Operational Variables
Operational variables constitute a critical component of quantitative research, as they function to translate theoretical concepts into empirically measurable indicators. In this study, two primary variables are employed: an independent variable and a dependent variable. The independent variable (X) is Capital Loan, while the dependent variable (Y) is Community Income. The selection of these variables is aligned with the main objective of the study, namely to analyze the effect of capital loans provided by UD AMB on the income levels of the community in Silakkidir Village.

Through the formulation of operational variables, each conceptual construct is transformed into measurable indicators, enabling the researcher to systematically collect data, conduct analysis, and draw objective conclusions. The clarity of these variables and their respective operational parameters facilitates the implementation of the research in accordance with the established methodological design and ensures that the relationship between capital loans and community income can be empirically tested and measured with precision.

4. Results and Discussion
Based on the frequency distribution table of respondents by gender, it can be observed that out of a total of 30 respondents, 13 individuals (43.33%) are male, while 17 individuals (56.67%) are female. These data indicate that the majority of clients of Usaha Dagang Ambarita (UD AMB) in Silakkidir Village are women.

The predominance of women as recipients of capital loans suggests that women play a substantial role in household economic activities and the management of small scale enterprises in the area. This finding aligns with the general characteristics of microenterprises in rural settings, which are often managed by women either in agricultural activities, household based trading, or other informal economic ventures. This condition illustrates that the capital loans distributed by UD AMB not only support household economic activities but also serve as an instrument of economic empowerment for women in Silakkidir Village.

Overall, the relatively balanced distribution of male and female respondents demonstrates that UD AMB's capital loan program is accessible to diverse community groups without evident gender-based disparities. This accessibility reflects the inclusive nature of the financing initiative and underscores its potential contribution toward gender equitable economic development in the community.

The descriptive statistical analysis of the two core variables Capital Loan and Community Income provides important preliminary insights into the distributional patterns and potential relationships between financing interventions and economic outcomes among rural households in Silakkidir Village. With a total of 30 respondents contributing to each variable, the dataset offers a sufficient basis for observing

tendencies and variance within the community.

For the Capital Loan variable, the observed minimum score of 7 and maximum score of 24, coupled with a relatively high mean value of 21.60, suggest that the majority of respondents received substantial financial support from UD AMB. The proximity of the average score to the upper limit of the scale reflects a broad uptake and utilization of financing resources, indicating that the capital loan program has reached a level of penetration sufficient to influence local economic activities. The standard deviation of 3.390 represents moderate dispersion, implying that although respondents received varying loan amounts, the distribution remains relatively clustered. This pattern aligns with findings from Kumar *et al*. (2021) [15] and Attah *et al*. (2020) [6], who emphasize that microfinance programs tend to show moderate variance in loan distribution due to standardized lending schemes commonly applied by informal lending institutions.

The Community Income variable demonstrates a comparable distributional structure, with a minimum score of 8, a maximum score of 24, and an identical mean of 21.60. The similarity in mean values across the two variables suggests a potential alignment between financial support and income generation. Moreover, the standard deviation of 3.133 slightly lower than that of the loan variable indicates a more homogeneous income distribution within the sample. This homogeneity may reflect the relatively uniform socioeconomic characteristics of farming households in the village or the shared dependence on agriculture as the primary source of livelihood. The narrow variation in income further supports the notion that the impact of capital loans may be relatively consistent across respondents.

From a theoretical standpoint, the descriptive patterns observed are consistent with the propositions of Capital Theory, which posits that access to capital is directly linked to improvements in production capacity and economic output (Meltzer, 2020). [19] The high mean scores for both variables imply that respondents who received larger capital loans tend to report higher income levels, reflecting an early indication of a positive association. Moreover, Household Income Theory suggests that household financial outcomes are shaped by access to productive resources, diversification capabilities, and capital utilization efficiency (Alkire *et al*., 2021) [3]. The homogeneity observed in income scores may indicate that respondents are utilizing capital in a relatively standardized manner, likely influenced by similar agricultural conditions and shared market access constraints.

The descriptive results also carry implications for Agricultural Development Theory, which emphasizes the role of capital in enabling smallholders to adopt innovation and reduce vulnerability (Li *et al*., 2021 [16]; Mekonnen *et al*., 2022). The substantial mean values across both variables suggest that the capital loan program may be functioning as an enabling mechanism for enhancing agricultural productivity, stabilizing household economies, and supporting broader rural development objectives.

Importantly, these descriptive indicators provide a foundational understanding that helps guide subsequent inferential analysis. The relative similarity in central tendency and dispersion across variables reinforces the plausibility of a statistically significant relationship between capital loans and household income an association that aligns with empirical findings across multiple developing-

country contexts (Razaq *et al*., 2022 [24]; Baiyegunhi *et al*., 2021). Thus, the descriptive statistics not only summarize the dataset but also contribute to theoretical validation and offer empirical grounding for the hypothesis that capital loan interventions positively influence income levels among rural farming households in Silakkidir Village.

4.1 Simple Regression

The results presented in the Coefficients table provide strong empirical evidence regarding the influence of capital loans on community income in Silakkidir Village. The simple linear regression model yields a constant value of 1.654, which reflects the baseline income level when no capital loan is provided. Although constants in Likert based models are not used for substantive interpretation, they are essential for estimating the regression equation and establishing the initial reference point for income prediction. The unstandardized coefficient for the Capital Loan variable is 0.923, indicating that each one unit increase in access to or utilization of capital loans leads to an estimated increase of 0.923 units in communit.

The very high t-value (115.390) and significance level (p < 0.001) demonstrate that the relationship is not only positive but also statistically robust. Furthermore, the standardized coefficient Beta (0.999) suggests an almost perfect predictive relationship, indicating that capital loans serve as a dominant factor in shaping household income among the respondents.

These findings are theoretically consistent with Capital Theory, which posits that increased capital availability enhances production efficiency and output, thereby improving income-generating capacity (Meltzer, 2020) [19]. In the context of smallholder communities, access to productive capital enables households to adopt improved inputs, invest in better technologies, and expand production, which collectively contribute to higher revenue streams. The significant coefficient of the capital loan variable aligns with the notion that credit alleviates liquidity constraints and allows farmers to invest in productivity enhancing activities an argument long upheld in development economics.

The present findings also corroborate evidence from empirical studies across developing countries. For instance, Kumar *et al*. (2021) [15] documented income increases of 20–25% among farmers who accessed productive credit, attributing this improvement to investments in high quality seeds, fertilizers, and mechanization. Attah *et al*. (2020) [6] similarly observed that rural credit stimulates entrepreneurial activities and diversification of household livelihoods, thereby strengthening income stability and reducing vulnerability to agricultural shocks. Razaq *et al*. (2022) [24] further demonstrated that access to microfinance strengthens smallholders' participation in modern agricultural value chains, which elevates both productivity and profitability.

Moreover, the present findings align with Household Income Theory, which states that household income is shaped by access to resources, diversification of economic activities, and the capacity to utilize capital effectively (Alkire *et al*., 2021) [3]. The near perfect Beta coefficient indicates that capital loans directly bolster the income-generating ability of households, likely by enabling them to diversify economic activities either within agriculture or through supplementary non farm enterprises. This interpretation is supported by research from Gichuki *et al*.

(2021) [10], who found that access to credit, when combined with sufficient financial literacy, significantly enhances households' capacity to generate stable incomes and manage economic risks.

Additionally, the results reinforce insights from Agricultural Development Theory, which highlights the necessity of integrating capital, technology, human capacity, and institutional support to drive sustainable rural development (Li *et al*., 2021) [16]. Capital loans, as demonstrated in this study, play a central role in this integration, functioning as the foundational resource that enables farmers to adopt modern technologies, improve input quality, and enhance efficiency. The strength of the regression results suggests that the capital loan scheme implemented by UD AMB is effectively addressing one of the most critical constraints faced by rural farmers limited access to financial resources (Asfaw *et al*., 2020; Kansiime & Mastenbroek, 2022 [13]).

The reliability diagnostics of the regression model further reinforce the robustness of the findings. The Tolerance (1.000) and VIF (1.000) values confirm the absence of multicollinearity, indicating that the independent variable used in the model is not confounded by overlapping explanatory effects. This enhances the credibility of the regression output and suggests that capital loans are indeed the primary determinant of income variation within this research context.

Taken together, the regression results not only demonstrate the statistical significance of capital loans but also validate the theoretical significance of financial access in rural economic development. This study adds to the growing body of literature emphasizing that micro level credit mechanisms especially those provided by local institutions such as UD AMB can substantially enhance household welfare when aligned with the social and economic realities of rural communities. The findings affirm that capital loans are a key enabler of improved household income and provide empirical justification for strengthening localized credit delivery models as part of broader agricultural and rural development strategies.

4.2 Hypothesis Testing

The hypothesis testing in this study aims to determine the extent to which the capital loans provided by UD AMB influence household income in Silakkidir Village. Based on the simple linear regression analysis presented in the Coefficients table, the calculated t-value is 115.390 with a significance level of $p < 0.001$. This significance value, which is far below the conventional probability threshold of 0.05, indicates that the capital loan variable exerts a highly significant effect on community income.

Accordingly, the null hypothesis (H_0), which states that capital loans have no influence on household income, is rejected. Conversely, the alternative hypothesis (H_1), which posits that capital loans positively affect household income, is accepted. The regression coefficient of 0.923 implies that each one-unit increase in the capital loan score leads to a corresponding increase of 0.923 units in household income. Furthermore, the standardized Beta coefficient of 0.999 demonstrates an almost perfect strength of association between the two variables, underscoring the dominant role of capital loans in shaping income levels among respondents.

The validity of the regression model is reinforced by the Tolerance (1.000) and VIF (1.000) values, which confirm

the absence of multicollinearity. This indicates that the independent variable does not overlap with any other explanatory factors and that the estimated model is statistically sound.

Overall, the hypothesis testing results provide strong empirical evidence that capital loans play a critical role in enhancing household income. These findings align with the objectives of UD AMB's financing program, which seeks to strengthen rural economic empowerment through improved access to productive capital.

4.3 Coefficient of Determination (R²)

Based on the regression output presented in the Model Summary table, the coefficient of correlation (R) is recorded at 0.999, indicating an exceptionally strong linear relationship between the variables of capital loans and community income. This high correlation reflects a near-perfect association, suggesting that increases in capital loans are strongly aligned with increases in household income in the study area.

Furthermore, the value of R Square (R^2), which stands at 0.998, reveals that 99.8% of the variance in community income can be explained by the capital loan variable included in the regression model. This proportion is extraordinarily high for social science research, signifying that the model possesses remarkable explanatory and predictive power. The Adjusted R Square, which also remains at 0.998 after adjusting for the number of predictors and sample size, confirms the model's robustness and stability, indicating that the predictive capability is not artificially inflated by the sample size.

The Standard Error of the Estimate, reported at 0.146, demonstrates that the model's prediction error is extremely low, implying that the estimated values of community income closely align with the actual observed values. Additionally, the Durbin–Watson statistic of 1.457 falls within the acceptable range, indicating no problematic autocorrelation in the residuals, although the value suggests a slight positive tendency that remains within tolerance limits.

Collectively, these findings provide compelling empirical evidence that capital loans exert a substantial and statistically meaningful influence on community income. The strength, precision, and consistency of the model further affirm that the regression framework employed in this study is highly appropriate for drawing valid inferences regarding the financial empowerment effects of UD AMB's capital loan program on households in Silakkidir Village.

5. Discussion

The findings of this study demonstrate that the capital loans provided by Usaha Dagang Ambarita (UD AMB) exert a highly significant influence on increasing household income in Silakkidir Village, Hutabayu Raja District. Based on the descriptive statistical analysis, the mean values for both the capital loan variable and the community income variable are equally high, at 21.60, with relatively elevated minimum and maximum scores. This pattern indicates that most respondents received substantial loan amounts and experienced correspondingly high income levels. The relatively small standard deviation further suggests that respondents are fairly homogeneous in terms of both the size of the loans received and their income levels.

The simple linear regression analysis offers strong empirical evidence regarding the relationship between capital loans (X) and community income (Y). The regression coefficient of 0.923 implies that an increase in capital loans is positively associated with an increase in income. Specifically, each one-unit increase in the loan score raises household income by 0.923 units. This finding suggests that capital loans are not merely supplemental financial assistance but are utilized productively to expand small businesses, purchase agricultural inputs or merchandise, and strengthen local production capacity.

The hypothesis testing using the t-test further reinforces this conclusion. The t-statistic of 115.390 with a significance level below 0.001 confirms that the effect of capital loans on income is highly significant and not due to random chance. Consequently, the null hypothesis (H_0), which posits that capital loans have no effect on household income, is rejected, and the alternative hypothesis (H_1) is accepted. The standardized beta value of 0.999 demonstrates an almost perfect relationship between the two variables, emphasizing the strength of the model.

The coefficient of determination ($R^2 = 0.998$) indicates that 99.8% of the variance in household income can be explained by capital loans, leaving only 0.2% attributable to other factors outside the model. This exceptionally high value underscores the model's predictive power. The Durbin–Watson value of 1.457 also suggests an absence of problematic autocorrelation, meaning the regression analysis is statistically reliable. Collectively, these results show that capital loans constitute a critical determinant of income enhancement among households in Silakkidir Village.

The empirical findings of this study align with previous international research emphasizing the strong correlation between access to financing and increased productivity and income. Kumar et al. (2021) [15] found that credit access can increase farmers' income by up to 25% through improved inputs and enterprise diversification. Similarly, Attah et al. (2020) [6] demonstrated that capital loans stimulate rural entrepreneurship, leading to higher household income. These results support Capital Theory, which posits that capital serves as a primary driver of production capacity and long term income growth. They also corroborate the Household Income Theory, which asserts that household income is significantly shaped by access to financial resources and the capacity to use such resources productively.

Overall, the results of this study indicate that the capital loan program implemented by UD AMB significantly contributes to improving the economic capacity of rural households and serves as an effective instrument for economic empowerment in Silakkidir Village. To further enhance the program's effectiveness, complementary interventions such as business coaching, financial literacy training, and the establishment of monitoring systems for loan utilization would be beneficial to ensure that the loans generate sustainable long-term outcomes.

The strong relationship identified in this study is further supported by international literature. Olagunju et al. (2022) [23], for example, found that microcredit access in Nigeria increased household income by up to 30% through enhanced production capacity and enterprise diversification. Likewise, Li et al. (2021) [16] observed that capital support is fundamental to the successful adoption of agricultural innovations in Asia. Baiyegunhi et al. (2021) also reported that access to credit improves farmers' ability to purchase high-quality inputs and manage production risks, thereby raising income levels. Similarly, Khanal and Mishra (2020) [14] found that farmers with access to credit consistently earn higher incomes, even when controlling for education and asset ownership. Collectively, these studies reinforce the conclusion that capital is a pivotal instrument in improving rural welfare.

However, not all research aligns with these findings. Abate et al., 2014 found that access to credit does not always improve household income in Ethiopia, particularly when loans are not accompanied by financial literacy training or business support. In some cases, credit may even exacerbate debt burdens and increase default risks. Nelsen and Ikhide (2021) [21] similarly observed that microcredit programs in parts of Africa have failed to increase household income due to high interest rates and weak managerial capacity among borrowers. Jote (2021) [12] further noted that the misuse of loans for consumption rather than productive activities reduces their impact on income. These contrasting findings highlight the importance of supporting conditions—such as borrower literacy, loan design, interest rates, and market stability in determining credit effectiveness.

Therefore, although this study confirms a very strong positive relationship between capital loans and income in Silakkidir Village, it is essential to situate this finding within a broader context. International research suggests that capital loans are not a standalone solution; they require complementary measures such as business mentoring, financial education, and monitoring mechanisms to ensure optimal and sustainable impact. Thus, this study not only contributes to the academic literature on microcredit effectiveness but also emphasizes the need for integrated strategies in rural economic empowerment.

6. Conclusion

Based on the findings of this study examining the effect of capital loans on household income in Silakkidir Village, Hutabayu Raja District, it can be concluded that the capital loans provided by Usaha Dagang Ambarita (UD AMB) exert a highly significant and positive influence on income enhancement among rural households. The regression results reveal a coefficient of determination (R^2) of 0.998, indicating that 99.8% of the variation in household income is explained by the capital loan variable, while only 0.2% is attributable to other factors outside the model. The regression coefficient of 0.923 further demonstrates a strong positive relationship between loan provision and income improvement, and the significance value of < 0.001 confirms that this effect is statistically robust.

These findings affirm that capital loans serve as an effective instrument for stimulating productive economic activities, enabling business expansion, enhancing production capacity, and ultimately contributing to improved household welfare. The empirical evidence also highlights that the credit mechanism implemented by UD AMB operates not merely as financial assistance but as a catalyst for economic empowerment within the community. Overall, the study underscores that UD AMB's capital loan program represents an appropriate and impactful strategy for strengthening the economic resilience of rural households and plays a pivotal role in promoting inclusive and sustainable community development.

6.1 Recommendations

Based on the findings of this study, several recommendations can be proposed to enhance the effectiveness of the capital loan program for the residents of Silakkidir Village. First, it is recommended that UD AMB not only provide financial capital but also strengthen its support systems through business mentoring, financial management training, and financial literacy initiatives. Such complementary assistance is essential to ensure that the loans are utilized productively, to reduce the risk of fund misallocation, and to minimize the likelihood of loan default.

Second, the loan scheme would benefit from greater flexibility, particularly regarding repayment periods and interest rates, to ensure that access to capital becomes more inclusive particularly for low income households. Adjustments of this nature could improve borrowers' repayment capacity and enhance the sustainability of the program.

Third, collaboration between UD AMB, village authorities, and relevant local institutions is crucial for expanding the reach and impact of the credit program. Joint efforts could include providing entrepreneurship training, improving market linkages, and facilitating access to modern production technologies. These initiatives would equip borrowers with broader capacities to manage and grow their enterprises.

Furthermore, future research is encouraged to incorporate additional variables such as entrepreneurial skills, financial literacy, or market access to obtain a more comprehensive understanding of the factors influencing household income. Expanding the analytical model would contribute to richer insights and stronger evidence for policy formulation.

Overall, these recommendations aim to strengthen the long-term effectiveness of the capital loan program and enhance its contribution to sustainable local economic development.

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