ISSN 2663-127X

Vol. 7, Iss. 1 (2026), pp 264 – 278, July 3, 2026. www.reviewedjournals.com, ©Reviewed Journals

RWANDA AGRICULTURE BOARD SUPPORT AND SOCIO-ECONOMIC IMPROVEMENT OF BENEFICIARIES: A CASE OF COOPERATIVE OF RICE DEVELOPMENT OF MUTARA VALLEY IN NYAGATARE DISTRICT

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Accepted: June 15, 2026

DOI: https://doi.org/10.61426/business.v7i1.545

ABSTRACT

This study examined the role of Rwanda Agriculture and Animal Resources Development Board (RAB) support programs on the socio-economic improvement of beneficiaries, with a focus on CODERVAM Cooperative in Nyagatare District, Rwanda. Specifically, it assessed the influence of training programs, financing support, and technical support on farmers' socio-economic outcomes, including income levels, food security, asset ownership, and living standards. A cross-sectional descriptive research design was adopted, integrating both quantitative and qualitative approaches. Data were collected from a sample of 170 respondents selected from a target population of 320 using stratified and simple random sampling techniques. Primary data were gathered using structured questionnaires and interview guides, while secondary data were obtained through document review. Data were analyzed using descriptive statistics, correlation analysis, and multiple regression analysis with the aid of SPSS version 27. The findings revealed that training programs were highly rated by respondents (composite mean = 4.45), financing support (mean = 4.44), and technical support (mean = 4.43), indicating strong positive perceptions of RAB interventions. Correlation results showed a strong positive relationship between socio-economic improvement and training programs ($r = 0.688$, $p = 0.000$), financing support ($r = 0.615$, $p = 0.000$), and a moderate relationship with technical support ($r = 0.353$, $p = 0.000$). Regression analysis indicated that training programs ($\beta = 0.438$, $p = 0.000$) and financing support ($\beta = 0.389$, $p = 0.000$) significantly influence socio-economic improvement, while technical support ($\beta = 0.049$, $p = 0.425$) was not statistically significant. The model explained 57.3% of the variation in socio-economic improvement ($R^2 = 0.573$), confirming a strong explanatory power of the independent variables. The study concludes that RAB training and financing support are key drivers of socio-economic improvement among cooperative members, while technical support plays a complementary but less significant role. It recommends strengthening integrated agricultural support systems, improving access to timely financing, and enhancing the quality and reach of training and extension services.

Keywords: *Rwanda Agriculture Board; RAB; CODERVAM; training programs; financing support; technical support; socio-economic improvement; Nyagatare District; rice cooperative; smallholder farmers.*

CITATION: Sebahire, M., & Irechukwu, E. N. (2026). Rwanda agriculture board support and socio-economic improvement of beneficiaries: A case of cooperative of rice development of Mutara Valley in Nyagatare District. *Reviewed Journal International of Business Management*, 7 (1), 264 – 278.

BACKGROUND OF THE STUDY

Globally, agriculture continues to serve as a critical driver of economic growth, food security, and poverty reduction, especially in low- and middle-income countries where rural populations rely heavily on farming for livelihoods. International development institutions emphasize that agricultural transformation supports inclusive economic progress by generating employment, strengthening food systems, and enhancing resilience to climate and market disruptions. The World Bank identifies agriculture as a major instrument for reducing extreme poverty through agribusiness development, infrastructure investment, and institutional support systems (World Bank, 2024). In addition, the Food and Agriculture Organization underscores that smallholder farmers remain central to global food production, although they often face constraints related to limited financing, inadequate infrastructure, and environmental vulnerability, thereby necessitating cooperative structures and policy-based interventions to improve sustainability and welfare outcomes (FAO, 2023).

In the United States, agriculture has developed into a technologically advanced and policy-supported sector characterized by commercialization, innovation, and extensive institutional backing. Federal agricultural systems provide subsidies, extension services, and financing mechanisms that improve productivity while sustaining rural livelihoods. The United States Department of Agriculture highlights that coordinated agricultural policies, cooperative enterprises, and market support systems have historically strengthened income generation, food production, and employment across farming communities (USDA, 2023). National agricultural development strategies increasingly prioritize precision farming, climate-smart technologies, and digital agriculture to enhance sustainability, improve household earnings, and reinforce resilience among farmers.

In China, agricultural reform has significantly contributed to rural poverty reduction and socio-economic transformation through strong state-led interventions centered on cooperative systems and rural revitalization policies. Government institutions have prioritized smallholder modernization through subsidies, irrigation expansion, technical support, and strengthened farmer organizations to improve agricultural efficiency and welfare. The Ministry of Agriculture and Rural Affairs notes that cooperative development has expanded rapidly, facilitating market integration, technological adoption, and income growth among rural producers (Ministry of Agriculture and Rural Affairs, 2023). Scholarly evidence further indicates that cooperative participation in China improves access to machinery, credit, and social protection while significantly raising household incomes, particularly in underserved rural communities (Zhang, Li, & Wang, 2024).

Across Sub-Saharan Africa, agriculture remains central to employment creation, GDP contribution, and poverty alleviation, particularly for rural populations dependent on smallholder farming. Regional development institutions emphasize that despite agriculture's importance, farmers frequently encounter structural challenges including poor infrastructure, limited mechanization, weak financial systems, and climate-related risks. The African Development Bank reports that agriculture accounts for a substantial share of employment and national productivity in many African economies, underscoring the necessity of strategic agricultural investment (African Development Bank, 2023). Cooperative development, donor-supported interventions, and national agricultural programs increasingly focus on irrigation, extension services, and value-chain enhancement, with empirical studies showing that such interventions can significantly improve household welfare, productivity, and food security when effectively localized (Omondi, Kariuki, & Njoroge, 2022).

In Rwanda, agriculture remains a strategic sector for socio-economic transformation, poverty reduction, and rural development, with institutional frameworks strongly promoting cooperative-based agricultural modernization. The Rwanda Agriculture and Animal Resources Development Board has played a key role in transforming subsistence agriculture into commercially viable production systems through irrigation, mechanization, input provision, and capacity-building initiatives. National agricultural strategies emphasize cooperative strengthening, productivity enhancement, and market integration as central to Vision 2050

objectives (Rwanda Agriculture and Animal Resources Development Board, 2024). Evidence from supported agricultural cooperatives indicates that beneficiaries experience increased income, improved food security, better education outcomes, and enhanced asset accumulation, particularly in rice-producing regions such as Nyagatare District.

This study focuses on the Cooperative of Rice Development of Mutara Valley (CODERVAM) in Nyagatare District, Eastern Province, Rwanda, as a critical case for examining how institutional agricultural support translates into socio-economic outcomes for smallholder beneficiaries. Established in 1982, CODERVAM comprises over 1,080 rice-producing households operating within one of Rwanda's largest irrigated lowland schemes, making it a strategic site for assessing the effectiveness of RAB interventions including certified seed distribution, extension services, irrigation maintenance, and market linkage facilitation. Despite receiving sustained government backing, cooperative members continue to report challenges such as delayed payments, limited access to quality inputs, post-harvest losses, and inconsistent market prices, which collectively constrain household income growth and food security improvements (Mugabo, Niyonsenga, & Uwimana, 2023).

Statement of the Problem

Despite Rwanda's substantial public investment in agricultural transformation, smallholder rice farmers continue to face persistent productivity and socio-economic constraints that limit household welfare improvements. National data indicate that while paddy rice production reached 131,577 metric tons in 2019, average yields remain at approximately 4.0 tons per hectare, substantially below the agronomic potential of 7.0 tons per hectare achievable under optimized management conditions (Globalmax and Development Ltd., 2022). Furthermore, domestic production meets only 57 percent of national rice demand, with the remainder dependent on imports that undermine local price stability and farmer income security (Ministry of Agriculture and Animal Resources, 2022). In Nyagatare District specifically, members of CODERVAM report recurrent challenges including delayed payments, inadequate access to certified seeds and fertilizers, limited post-harvest infrastructure, and weak market linkages, which collectively constrain household income growth, food security, and asset accumulation despite participation in institutional support programs.

Although several Rwandan studies have examined agricultural cooperatives and rural development, significant contextual, methodological, and policy-specific gaps limit their applicability to rice-focused interventions in Nyagatare District. Existing studies aggregate outcomes without disaggregating effects by gender, farm size, or participation intensity, thereby obscuring differential benefits among beneficiary subgroups. Collectively, these gaps underscore the need for context-specific research that examines how RAB-targeted interventions translate into tangible socio-economic improvements for rice cooperative members in Nyagatare District.

Objectives of the Study

The general objective was to investigate the role of Rwanda Agriculture Board Support in socio-economic improvement of beneficiaries with a case of CODERVAM in Nyagatare District. The specific objectives were:

- To examine the role of RAB training programs on the socio-economic improvement of beneficiaries in CODERVAM, Nyagatare District.
- To assess the role of RAB financing support on the socio-economic improvement of beneficiaries in CODERVAM, Nyagatare District.
- To evaluate the role of RAB technical support on the socio-economic improvement of beneficiaries in CODERVAM, Nyagatare District.

This study tested the following hypotheses;

- **H_{01}:** RAB training programs have no statistically significant effect on the socio-economic improvement of beneficiaries in CODERVAM, Nyagatare District.

- **H_{02}:** RAB financing support has no statistically significant effect on the socio-economic improvement of beneficiaries in CODERVAM, Nyagatare District.
- **H_{03}:** RAB technical support has no statistically significant effect on the socio-economic improvement of beneficiaries in CODERVAM, Nyagatare District.

LITERATURE REVIEW

Training Programs and Socio-Economic Improvement

Training programs are widely recognized as a cornerstone of agricultural development, particularly for smallholder farmers in developing economies. Hernández-López, García-Sánchez, and Ramírez-Torres (2023) found that context-specific, hands-on training programs substantially enhance both productivity and household welfare among smallholders. Similarly, Suryani, Prasetyo, and Dewi (2022) observed that integrated training programs delivered through cooperative structures generate synergistic socio-economic benefits, including higher annual incomes and reduced post-harvest losses. The World Bank (2024) further supports these findings, noting that frequent and continuous agricultural training significantly improves farmer capacity, technology adoption, and overall productivity in rural development programs.

In Rwanda, Mugabo, Niyonsenga, and Uwimana (2023) confirmed that agricultural training contributes to improved welfare outcomes among cooperative members, while the Rwanda Agriculture and Animal Resources Development Board's extension framework emphasizes field-based learning as a primary driver of behavioral change. The World Economic Forum (2023) cautions that while training initiatives are widespread, gaps in access, quality, and relevance often reduce their effectiveness, particularly among smallholder farmers with lower educational backgrounds.

Financing Support and Socio-Economic Improvement

Access to financial resources is consistently identified as a critical enabler of agricultural transformation and rural livelihood improvement. Thompson, Leblanc, and Chen (2024) demonstrated that targeted financing support mechanisms substantially enhance business sustainability and household welfare by reducing income volatility and enabling capital investment. Tanaka, Sato, and Yamamoto (2023) found that cooperative-based microfinance programs contribute to improved farm productivity, income diversification, and higher self-reported life satisfaction among small-scale farmers. The World Bank (2023) reinforces this, asserting that improved access to agricultural finance through cooperatives significantly enhances smallholder farmers' investment capacity and productivity outcomes.

The African Development Bank (2024) notes that delays in fund disbursement and inadequate funding amounts remain key constraints affecting the effectiveness of agricultural financing programs in Sub-Saharan Africa. Moyo, Chikovore, and Dube (2024) emphasize that while access to credit is vital, its socio-economic impact is maximized only when financial intermediation is effectively integrated with training and technical assistance.

Technical Support and Socio-Economic Improvement

Technical support through extension services, field visits, and advisory assistance plays a complementary role in agricultural development. Mitchell, O'Brien, and Patel (2024) found that while technical assistance enhances input-use efficiency and climate-adaptive practices, its direct translation to income stability often depends heavily on the farmer's existing resource base and market conditions. The Food and Agriculture Organization (2023) argues that technical support is most effective when combined with financing and training interventions, as isolated technical advice may not lead to sustained welfare improvements if farmers lack the capital or foundational knowledge to implement recommendations.

Nkosi, Mokoena, and van der Merwe (2023) emphasize that bundled services including agronomic advisory, mechanization access, and business development training are required to significantly strengthen economic

viability and create on-farm jobs. These findings suggest that technical support, while beneficial for improving day-to-day farming practices, requires integration with financing and training to yield statistically significant, long-term socio-economic improvements.

Theoretical Framework

This study was anchored on three theoretical frameworks. Human Capital Theory (Becker, 1964) posits that investment in people's knowledge and skills enhances their productivity and economic outcomes — a perspective that directly supports the role of RAB training programs in improving farmer welfare. Financial Intermediation Theory (Gurley & Shaw, 1955) explains how financial institutions channel resources to productive uses, underpinning the role of RAB financing support in enabling agricultural investment and income generation. Resource-Based Theory contends that sustained competitive advantage derives from an organization's unique resource endowments, justifying RAB's provision of technical support and infrastructure resources to enhance cooperative members' productive capacity.

Conceptual Framework

The conceptual framework posits that RAB support interventions (training programs, financing support, and technical support) as independent variables directly influence socio-economic improvement among CODERVAM cooperative members as the dependent variable. Socio-economic improvement is operationalized through indicators including household income, food security, asset ownership, living standards, education access, health service access, and financial stability. The framework recognizes that external factors such as cooperative governance quality, agro-ecological conditions, and market dynamics may mediate or moderate these relationships. The conceptual framework for this study integrates Human Capital Theory, Financial Intermediation Theory, and Resource-Based Theory to explain how Rwanda Agriculture and Animal Resources Development Board (RAB) support interventions specifically training programs, financing support, and technical assistance interact to influence socio-economic improvement among rice cooperative beneficiaries in Nyagatare District. World Bank posits that "agricultural support systems that bundle capacity-building, financial access, and extension services generate synergistic effects on productivity and household welfare that exceed the sum of isolated interventions" (World Bank, 2024). This is shown in Figure 1

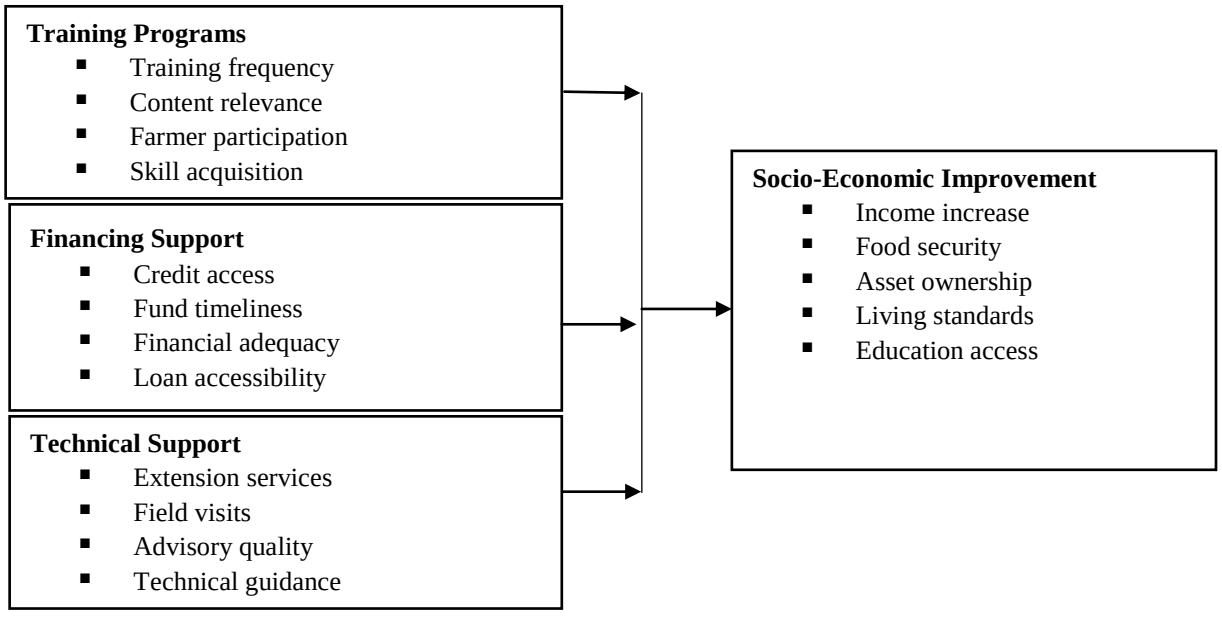

Figure 1: Conceptual Framework

Source: Researcher (2024)

The conceptual framework for this study presents the hypothesized relationships between three independent variables Training Programs, Financing Support, and Technical Support and the dependent variable, Socio-Economic Improvement, among rice cooperative beneficiaries in Nyagatare District. Training Programs, measured through training frequency, content relevance, farmer participation, and skill acquisition, are conceptualized as human capital investments that strengthen farmers' knowledge and productive capacity. The World Bank (2024) notes that "agricultural training interventions that are participatory, context-specific, and continuous significantly improve technology adoption, productivity, and household welfare." Financing Support, operationalized through credit access, fund timeliness, financial adequacy, and loan accessibility, addresses liquidity constraints and enables investment in agricultural inputs and infrastructure. In this regard, Moyo, Chikovore, and Dube (2024) observe that "timely and adequate access to credit enhances input adoption, increases yields, and promotes income diversification among smallholder farmers." Technical Support, measured by extension services, field visits, advisory quality, and technical guidance, provides farmers with essential knowledge and practical skills for improved decision-making. The Food and Agriculture Organization (2023) emphasizes that "effective extension services and technical guidance enhance farmers' capacity to adopt climate-smart practices and improve resilience to agricultural risks."

The framework further posits that these independent variables operate in a complementary and reinforcing manner to influence Socio-Economic Improvement, which is measured through income increase, food security, asset ownership, improved living standards, and access to education. Mugabo, Niyonsenga, and Uwimana (2023) explain that "integrated support systems combining training, financing, and technical advisory services generate greater welfare improvements than standalone interventions among cooperative farmers." The interaction of these interventions is expected to produce synergistic effects that enhance agricultural productivity and household welfare outcomes.

However, the effectiveness of these relationships is influenced by contextual and institutional factors such as cooperative governance, farmer participation, and agro-ecological conditions. Irechukwu (2024) argues that "trust-building and participatory market intelligence improve the alignment between institutional support and beneficiary needs, thereby enhancing development outcomes." Similarly, Karangwa and Irechukwu (2023) emphasize that "the effectiveness of agricultural support interventions depends on the alignment between resource provision, management systems, and institutional capacity." Ultimately, the framework guides the empirical assessment of how RAB-supported training, financing, and technical interventions contribute to socio-economic improvement among members of the Cooperative of Rice Development of Mutara Valley when properly implemented and contextually adapted.

METHODOLOGY

Research Design

This study adopted a cross-sectional descriptive research design integrating both quantitative and qualitative approaches (mixed methods). A descriptive survey component measured the extent and quality of RAB support practices and their statistical association with socio-economic improvement indicators, while qualitative interviews provided contextual depth. This design aligns with contemporary agricultural development research in decentralized settings where multi-source evidence is critical for generating actionable, policy-relevant insights (Creswell & Plano Clark, 2023).

Target Population and Sampling

The target population comprised 320 stakeholders directly involved in CODERVAM cooperative activities in Nyagatare District, including rice farmers, cooperative leaders, RAB extension officers, and agricultural stakeholders. Using stratified and simple random sampling techniques, a sample of 170 respondents was selected. Stratification ensured proportional representation across stakeholder categories, while random

selection within strata guaranteed representativeness. The sample size was determined using established sampling formulas appropriate for the population size and acceptable margin of error.

Table 1: Target Population and Sample Size Selection

Category	Target Population	Sample Size
CODERVAM Rice Farmers	240	128
Cooperative Leaders	30	16
RAB Extension Officers	30	16
Agricultural Stakeholders	20	10
Total	**320**	**170**

Source: Study data (2024)

Research Instruments

Primary data were gathered using structured questionnaires employing a 5-point Likert scale (1=Strongly Disagree to 5=Strongly Agree) covering training programs, financing support, technical support, and socio-economic improvement. Interview guides were administered to cooperative leaders, RAB officers, and stakeholders to gather qualitative insights. Secondary data were obtained through document review of cooperative records, RAB reports, and district agricultural plans.

Validity and Reliability

Content validity was established through expert review, yielding an average Content Validity Index (CVI) of 0.90, exceeding the recommended minimum threshold of 0.78 (Polit & Beck, 2021). Reliability was assessed using Cronbach's Alpha during pilot testing. All variables achieved Alpha coefficients above the acceptable threshold of 0.70, confirming consistent measurement of the intended constructs.

Table 2: Reliability Analysis Results

Variable	Cronbach's Alpha	Remarks
Training Programs	0.856	Reliable
Financing Support	0.879	Reliable
Technical Support	0.843	Reliable
Socio-Economic Improvement	0.867	Reliable

Source: Pilot data (2024)

Data Analysis

Quantitative data were analyzed using SPSS version 27. Descriptive statistics (frequencies, means, standard deviations) summarized variable characteristics. Inferential analyses included Pearson correlation to examine bivariate relationships and multiple linear regression to test the combined influence of the independent variables on socio-economic improvement. The regression model was specified as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$$

Where Y = Socio-Economic Improvement; X_1 = Training Programs; X_2 = Financing Support; X_3 = Technical Support; β_0 = constant; ε = error term. Qualitative data from interviews were analyzed thematically following Braun and Clarke's (2022) six-phase approach.

FINDINGS AND DISCUSSION

Response Rate

Out of 170 questionnaires distributed, 170 were successfully completed and returned, representing a 100% response rate. This high response rate was achieved through persistent follow-up, face-to-face administration, and assurances of confidentiality provided to respondents.

Background Information of Respondents

The majority of respondents were male (64.7%), with a predominant age group of 35–44 years (38.2%). Most respondents (72.4%) were married, and the largest proportion had secondary education (41.2%). Rice farming was the primary occupation for 75.3% of respondents. In terms of cooperative membership, 68.2% were ordinary farmer members, while 18.8% served on cooperative committees. Farm sizes ranged predominantly from 0.5 to 2 hectares, reflecting the smallholder nature of CODERVAM operations.

Descriptive Statistics

Training Programs

Table 3 presents descriptive statistics on training programs. Results indicate that respondents highly rated all dimensions of RAB training interventions.

Table 3: Respondents' Views on Training Programs

Statements on Training Programs	SD	D	NS	A	SA	Mean	Std Dev
Training programs are conducted frequently by RAB	0.6%	1.2%	5.3%	28.2%	64.7%	4.55	0.694
Training content is relevant to rice farming activities	0.6%	0.6%	7.1%	28.8%	62.9%	4.52	0.712
Training has improved my farming knowledge and skills	0.6%	0.6%	5.9%	29.4%	63.5%	4.55	0.699
Training helps me adopt modern farming techniques	0.6%	1.8%	5.9%	29.9%	61.8%	4.50	0.748
Composite Mean						**4.45**	

Source: Study data (2024)

The composite mean of 4.45 indicates that respondents strongly agreed that RAB training programs are frequent, relevant, and effective in improving agricultural knowledge and practice. According to the World Bank (2024), agricultural training programs that enhance farmer capacity directly translate into improved household welfare outcomes.

Financing Support

Financing support was also highly rated, with a composite mean of 4.44. Majority of respondents (65.3%) strongly agreed that they have access to RAB financing support, and 67.6% confirmed that financing is easily accessible through the cooperative. Results showed that financial support significantly enables input purchases, enhances investment capacity, and improves household food security. A notable proportion (56.5%) agreed that the amount received is adequate, though variability in this item suggests some challenges with funding adequacy.

Technical Support

Technical support received a composite mean of 4.43. The majority of respondents confirmed receiving regular extension services (54.7% strongly agreed) and frequent field visits (64.7%). Respondents also indicated improved irrigation knowledge (62.9%) and reduced post-harvest losses (54.1%) as a result of RAB technical assistance. Despite positive perceptions, qualitative responses highlighted inconsistencies in service delivery and insufficient follow-up after field visits as notable challenges.

Socio-Economic Improvement

Table 4: Respondents' Views on Socio-Economic Improvement

Statements on Socio-Economic Improvement	SD	D	NS	A	SA	Mean	Std Dev
Household income has increased due to RAB support	0.6%	0.6%	5.9%	27.1%	65.9%	4.57	0.687
I can afford basic household needs more easily	0.6%	0.6%	7.1%	25.3%	66.5%	4.56	0.704
Household food security has improved	0.6%	3.5%	8.2%	24.1%	63.5%	4.46	0.837
Acquired more productive assets (land, equipment, livestock)	0.6%	1.8%	17.6%	25.3%	54.7%	4.32	0.866
Living standards have improved since joining the cooperative	1.2%	0.6%	5.9%	27.1%	65.3%	4.55	0.738
Better access to education for children	1.2%	1.2%	4.7%	27.6%	65.3%	4.55	0.746
Better access to health services than before	0.0%	3.5%	7.1%	25.3%	64.1%	4.50	0.779
More financially stable compared to previous years	2.9%	4.1%	4.7%	40.6%	47.6%	4.26	0.944
Composite Mean						**4.47**	

Source: Study data (2024)

The composite mean of 4.47 confirms strong agreement that RAB support programs have significantly improved socio-economic conditions among CODERVAM members. The International Fund for Agricultural Development (2024) asserts that integrated agricultural support systems play a key role in enhancing income stability, health access, and long-term rural development outcomes.

Correlation Analysis

Pearson correlation analysis was conducted to examine the relationships between the independent variables and socio-economic improvement.

Table 4: Correlation Matrix

Variable	Socio-Economic Improvement	Training Programs	Financing Support	Technical Support
Socio-Economic Improvement	1.000	—	—	—
Training Programs	.688**	1.000	—	—
Financing Support	.615**	.500**	1.000	—
Technical Support	.353**	.369**	.356**	1.000

** Correlation is significant at the 0.01 level (2-tailed). N = 170

Source: Study data (2024)

The results show that training programs had the strongest positive correlation with socio-economic improvement (r = 0.688, p = 0.000), followed by financing support (r = 0.615, p = 0.000), and technical support (r = 0.353, p = 0.000). All correlations were statistically significant at the 0.01 level, indicating meaningful positive associations between all three RAB support interventions and beneficiary welfare outcomes. The World Bank (2024) confirms that integrated agricultural support programs combining skills development and financial inclusion significantly enhance productivity and household welfare.

Multiple Regression Analysis

Table 5: Combined Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of Estimate	Durbin-Watson
1	.757a	.573	.565	.16268	2.007

a. Predictors: (Constant), Technical Support, Financing Support, Training Programs. b. Dependent Variable: Socio-Economic Improvement

Source: Study data (2024)

The model indicates a strong positive relationship between the independent variables and socio-economic improvement (R = 0.757). The coefficient of determination ($R^2 = 0.573$) suggests that 57.3% of the variation in socio-economic improvement is explained by the combined influence of training programs, financing support, and technical support. The Durbin-Watson statistic of 2.007 confirms the absence of significant autocorrelation (Field, 2021).

Table 6: Combined ANOVA Results

Model		df	Mean Square	F	Sig.
1	Regression	3	1.965	74.233	.000b
	Residual	166	.026		
	Total	169			

a. Dependent Variable: Socio-Economic Improvement. b. Predictors: (Constant), Technical Support, Financing Support, Training Programs

Source: Study data (2024)

The ANOVA results (F = 74.233, p = 0.000) confirm that the overall regression model is statistically significant, validating the collective predictive power of the three independent variables on socio-economic improvement.

Table 7: Coefficient Results for All Variables

Model	B	Std. Error	Beta	t	Sig.
(Constant)	.592	.306		1.936	.055
Training Programs	.438	.053	.497	8.238	.000
Financing Support	.389	.067	.351	5.847	.000
Technical Support	.049	.061	.045	.800	.425

a. Dependent Variable: Socio-Economic Improvement

Source: Study data (2024)

The regression equation derived from the analysis is:

Socio-Economic Improvement = 0.592 + 0.438 Training Programs + 0.389 Financing Support + 0.049 Technical Support

Training programs had the strongest significant positive effect on socio-economic improvement ($\beta = 0.438$, $t = 8.238$, $p = 0.000$), implying that a one-unit increase in training activities leads to a 0.438 increase in socio-economic improvement. Financing support also had a significant positive effect ($\beta = 0.389$, $t = 5.847$, $p = 0.000$), while technical support had a positive but statistically insignificant effect ($\beta = 0.049$, $p = 0.425$). These findings reject H_{01} and H_{02} but fail to reject H_{03}, indicating that training and financing are the primary drivers of socio-economic improvement among CODERVAM members.

Qualitative Findings

Qualitative findings from interviews corroborated the quantitative results. Cooperative leaders affirmed that RAB training sessions have substantially improved farmers' understanding of modern rice farming techniques in seed selection, fertilizer use, and water management. Agricultural officers noted that trained farmers report higher yields due to better agronomic practices. Regarding financing, beneficiaries confirmed that financial support enables purchase of fertilizers and improved seeds that were previously unaffordable. On technical support, extension officers emphasized the value of regular field visits in helping farmers detect pests early and apply appropriate control measures. However, respondents also noted challenges: limited training coverage for all members, delays in fund disbursement, and inconsistencies in extension service delivery. Cooperative managers recommended improved coordination, increased training frequency, and better integration of all three support modalities for maximized socio-economic impact.

Discussion of Findings

Training Programs and Socio-Economic Improvement

The findings confirm that training programs had the strongest positive and statistically significant influence on socio-economic improvement of CODERVAM members ($\beta = 0.438$, $p = 0.000$), with a composite mean of 4.45. This aligns closely with existing empirical literature. Hernández-López, García-Sánchez, and Ramírez-Torres (2023) found that context-specific, hands-on training substantially enhances both productivity and household welfare among smallholders. Suryani, Prasetyo, and Dewi (2022) observed that integrated training through cooperative structures generates synergistic socio-economic benefits. The World Bank (2024) further supports these findings, noting that frequent agricultural training significantly improves farmer capacity and technology adoption. The qualitative findings highlighted, however, that training coverage gaps and inadequate follow-up can limit effectiveness, consistent with World Economic Forum (2023) cautions about access and quality challenges in agricultural training.

Financing Support and Socio-Economic Improvement

The study established that financing support significantly and positively influences socio-economic improvement ($\beta = 0.389$, $p = 0.000$), with a composite mean of 4.44. This strongly corroborates existing empirical evidence. Thompson, Leblanc, and Chen (2024) demonstrated that targeted financing mechanisms substantially enhance household welfare by reducing income volatility. Tanaka, Sato, and Yamamoto (2023) found that cooperative-based microfinance improves farm productivity and life satisfaction. The African Development Bank (2024) acknowledges, however, that disbursement delays and inadequate funding remain key constraints. Moyo, Chikovore, and Dube (2024) emphasize that financing impact is maximized when integrated with training and technical assistance, reinforcing this study's finding that RAB support components work synergistically.

Technical Support and Socio-Economic Improvement

Technical support showed a moderate positive correlation with socio-economic improvement ($r = 0.353$, $p = 0.000$) but had a statistically insignificant regression effect ($\beta = 0.049$, $p = 0.425$). This suggests that while technical advice is valued, its standalone impact on measurable socio-economic outcomes is limited compared to training and financing. Mitchell, O'Brien, and Patel (2024) found that technical assistance's direct translation to income stability depends heavily on the farmer's existing resource base. The Food and Agriculture Organization (2023) argues that technical support is most effective when combined with financing and training, consistent with this study's finding that isolated technical interventions may not fully translate into measurable socio-economic gains. Nkosi, Mokoena, and van der Merwe (2023) confirm that bundled services are required to significantly strengthen economic viability.

CONCLUSIONS AND RECOMMENDATIONS

Training programs provided by RAB to CODERVAM members were highly rated (composite mean = 4.45). Regression analysis showed they had the strongest influence on socio-economic improvement ($\beta = 0.438$, $t = 8.238$, $p = 0.000$). Financing support was similarly highly rated (mean = 4.44) and significantly influenced socio-economic improvement ($\beta = 0.389$, $t = 5.847$, $p = 0.000$). Technical support was positively perceived (mean = 4.43) with a moderate correlation ($r = 0.353$, $p = 0.000$), but had a statistically insignificant regression effect ($\beta = 0.049$, $p = 0.425$), indicating it complements rather than independently drives socio-economic improvement. The combined model explained 57.3% of variation in socio-economic improvement ($R^2 = 0.573$, $F = 74.233$, $p = 0.000$).

The study concludes that RAB support interventions significantly influence socio-economic improvement among CODERVAM cooperative members in Nyagatare District. Training programs are the strongest predictor, confirming that capacity building is central to agricultural transformation. Financing support is a critical driver, enabling farmers to invest in inputs and expand production. Technical support has a positive but complementary role, with its effectiveness enhanced when combined with training and financing. The overall conclusion is that integrated agricultural support systems — combining training, financing, and technical assistance — are most effective in driving sustainable socio-economic transformation among smallholder farmers.

RAB and CODERVAM should strengthen the frequency, coverage, and practical orientation of training programs, ensuring equitable access for all farmer members. Financing support mechanisms should be improved to enhance timely access, adequacy, and ease of disbursement, enabling effective agricultural investment. Technical support services should be intensified through more regular field visits, continuous follow-up, and improved extension delivery to ensure full application of modern farming practices.

Agricultural policies should prioritize integrated support systems combining training, financing, and technical assistance to maximize socio-economic outcomes. Policymakers should strengthen coordination between RAB, cooperatives, and financial service providers to ensure efficient delivery. Policy reforms should enhance

accessibility to agricultural credit and sustainable funding for extension services, promoting inclusive rural development and food security.

Recommendations for Further Research

Further research should explore the long-term impact of integrated agricultural support programs on poverty reduction and rural transformation. Future studies should examine the role of gender, climate change, and market access in moderating RAB intervention effectiveness. Comparative studies across different districts or cooperatives are encouraged to enhance generalizability of findings on agricultural support and socio-economic development.

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