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Research Article

Determinants of Agricultural Cooperative Performance in Ethiopia: Evidence from Amhara National Regional State

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Abstract:

This study delves into the intricate dynamics shaping the performance of agricultural cooperatives in Ethiopia's Amhara region. It explores the roles of member participation, access to credit, management practices, and extension services, offering a multifaceted view of their collective impact. By analyzing primary data from 384 households through an ordinal logistic regression model in STATA 17, the research reveals that these factors significantly influence cooperative outcomes. Notably, active member participation emerges as a key driver of performance, with enhanced engagement leading to superior results. Similarly, effective management and better access to credit are positively correlated with improved cooperative functioning. The socio-demographic lens also uncovers the influence of income, highlighting its role in boosting performance. These findings underscore the importance of fostering engagement, refining management strategies, and improving access to resources like credit and extension services to strengthen agricultural cooperatives. The study contributes valuable insights into the cooperative landscape of Ethiopia, particularly in Amhara, while calling for further research to expand the scope and depth of understanding across diverse regional contexts.

Key words: agricultural cooperatives; performance; access to credit; management; extension services; membership

1.Introduction

Agricultural cooperatives have long been recognized as critical institutions for fostering economic and social development, especially in rural areas of developing countries. In Ethiopia, where agriculture contributes significantly to the national GDP and supports the livelihoods of the majority of the population, cooperatives play a pivotal role in addressing the challenges faced by smallholder farmers. These challenges include limited access to markets, financial resources, modern agricultural technologies, and technical knowledge. Agricultural cooperatives offer a collective platform for farmers to pool resources, share knowledge, and gain access to vital services, such as inputs, credit, and markets, which might otherwise be out of reach for individual farmers (Bernard et al., 2008; Wanyama, 2014). By facilitating economies of scale, cooperatives enhance the bargaining power of farmers, reduce transaction costs, and encourage the adoption of modern agricultural practices and technologies (Francesconi & Heerink, 2011). This collective approach is particularly crucial in Ethiopia, where smallholder farming predominates, and where farmers often struggle with market access, financial limitations, and inadequate technical knowledge (Abate et al., 2014).

In recent years, the Ethiopian government has increasingly focused on agricultural cooperatives as a central strategy to achieve food security, poverty reduction, and sustainable agricultural development (Fekadu Etefa, 2022). Various policy initiatives, such as capacity-building programs, financial support, and the establishment of cooperative unions and federations, have been implemented to strengthen this sector (Francesconi & Wouterse, 2019). However, the performance of agricultural cooperatives in Ethiopia has been uneven. While some cooperatives have succeeded in improving the livelihoods of their members, others continue to face significant challenges, such as low member participation, poor management practices, financial constraints, and limited access to extension services (Birchall, 2003). These issues underscore the need for further research to identify the key factors influencing cooperative performance and to explore how these factors can be leveraged to enhance the effectiveness and sustainability of agricultural cooperatives in Ethiopia.

Despite the recognition of agricultural cooperatives as important vehicles for rural development, the specific factors influencing their performance remain underexplored. Existing studies tend to focus on broad, collective

determinants of success, such as the role of member participation, access to credit, management practices, and extension services, but they often fail to unpack the individual effects of these factors on cooperative performance (Chagwiza et al., 2016; Birchall & Simmons, 2004). Moreover, the interplay between these factors is not well understood, particularly in the Ethiopian context, where cooperative performance can vary significantly depending on regional, institutional, and socio-economic conditions. While some studies have highlighted the importance of these factors in a general sense (Abate et al., 2014), empirical research that isolates and analyzes the individual contributions of each determinant is scarce. This research gap is particularly critical in Ethiopia, where agricultural cooperatives are central to the country's rural development strategy, but their performance is inconsistent and often suboptimal. Therefore, there is a need for in-depth, empirical studies that can provide a clearer understanding of the specific drivers of cooperative performance.

This study aims to address this gap by providing a comprehensive analysis of how key factors such as member participation, access to credit, management practices, and extension services individually and interactively affect the performance of agricultural cooperatives in Ethiopia. By focusing on the Amhara region, one of the country's most agriculturally significant areas, the research will offer valuable insights into the region-specific challenges faced by cooperatives and the factors that contribute to their success or failure. This study will be among the first to systematically disentangle the individual and combined effects of these determinants on cooperative performance in the Ethiopian context. In doing so, the research will contribute to the theoretical understanding of cooperative dynamics and provide actionable recommendations for policymakers, cooperative leaders, and development practitioners. These recommendations will help to design more targeted interventions aimed at enhancing the performance of agricultural cooperatives, thus improving the livelihoods of smallholder farmers and contributing to Ethiopia's broader goals of agricultural transformation and rural development.

The primary objective of this study is to examine the individual impact of member participation, access to credit, management factors, and extension services on the performance of agricultural cooperatives in Ethiopia. Using a quantitative research methodology and an ordinal logistic regression model, the study aims to isolate and analyze the effect of each determinant, providing a more nuanced understanding of the factors that drive agricultural cooperative performance.

The research is guided by the following question: How do member participation, access to credit, management factors, and extension services individually determine the performance of agricultural cooperatives in the Amhara region of Ethiopia? Addressing this question involves a comprehensive examination of each determinant's impact on cooperative performance, shedding light on the underlying dynamics that influence cooperative success. By focusing on the individual effects of these determinants, the study aims to provide a detailed understanding of the mechanisms through which cooperatives can achieve better outcomes for their members and contribute to the broader agricultural sector.

This research question not only addresses a critical gap in the current literature but also aligns with the broader goals of agricultural development and cooperative promotion in Ethiopia. The study holds significant relevance for key stakeholders, including policymakers, cooperative managers, and development practitioners. By analyzing how member participation, access to credit, management factors, and extension services individually influence cooperative performance, the research offers valuable insights into the mechanisms driving success in agricultural cooperatives. Such insights are essential for designing targeted interventions that can enhance the effectiveness and sustainability of cooperatives, not only in the Amhara region but across Ethiopia.

2. Literature Review

2.1 Theories of Determinants of Agricultural Cooperative Performance

The **Collective Action Theory** provides a robust framework for understanding the dynamics within agricultural cooperatives, emphasizing how individuals work together to achieve common goals. This theory is rooted in the idea that individuals with shared interests can benefit from coordinated efforts, especially in situations where individual actions may not lead to optimal outcomes without cooperation (Olson, 1965). In the context of agricultural cooperatives, collective action is crucial. Cooperatives are formed to address common challenges such as market access, credit availability, and resource management. By pooling resources—such as labor, capital, and knowledge—members can achieve economies of scale, enhance bargaining power, and improve access to essential services (Poteete & Ostrom, 2004).

The Collective Action Theory underscores the importance of **member participation** as a key determinant of cooperative success. High levels of participation lead to better decision-making, greater trust among members, and a stronger commitment to collective goals (Bijman & Verhees, 2011). In agricultural cooperatives, active participation can result in more effective governance structures and improved performance. Access to credit within cooperatives is similarly a collective action problem, where members contribute to a shared fund or seek joint loans to benefit all. The success of such financial mechanisms depends on the ability to mobilize member contributions and manage these resources effectively (Ostrom, 1990). Therefore, the effectiveness of credit access as a performance determinant hinges on sound collective financial management.

Effective **cooperative management** is a product of collective decision-making and shared leadership. Collective Action Theory suggests that strong leadership and transparent management practices facilitate cooperation and reduce potential conflicts within the group (Fulton & Giannakas, 2001). Well-managed cooperatives are better equipped to navigate market challenges and enhance overall performance. **Extension services**, which provide technical support and training, reinforce collective action by improving members' knowledge and skills. By promoting collective learning and the adoption of best practices, extension services contribute to more efficient production processes and improved cooperative performance (Barham & Chitemi, 2009).

In this study, Collective Action Theory serves as the foundation for examining how member participation, access to credit, management practices, and extension services individually influence the performance of agricultural cooperatives in Ethiopia. This theoretical framework enables the exploration of how members' collaborative efforts and shared management practices contribute to improved performance. It also helps identify the challenges cooperatives face in fostering cooperation and managing collective resources effectively.

2.2 Empirical Studies on Determinants of Agricultural Cooperative Performance

Agricultural cooperatives play a crucial role in enhancing the economic welfare of their members by improving access to markets, providing financial services, and facilitating knowledge transfer. Understanding the determinants of cooperative performance is critical for developing strategies that ensure their sustainability and effectiveness. This section reviews empirical studies on the key determinants of agricultural cooperative performance: member participation, access to credit, management practices, and extension services.

Member participation has been widely recognized as a critical factor in cooperative success. Empirical studies show that active involvement in decision-making processes, governance, and cooperative activities positively impacts performance (Gijselinckx & Bussels, 2014). High

participation levels lead to better governance, increased trust, and stronger member ownership. Hernandez-Espallardo et al. (2013) found that cooperatives with higher member participation demonstrated better financial performance and higher member satisfaction. Similarly, Bernard et al. (2008) noted that cooperatives with active member engagement were more successful in meeting members' needs, particularly regarding access to inputs and markets. In Ethiopia, Abebaw and Haile (2013) found that cooperatives with greater member participation were more effective in delivering services, underscoring the importance of encouraging active involvement.

Access to credit is another significant determinant of cooperative performance. Empirical studies suggest that cooperatives with better credit access are more efficient in their operations and can offer more substantial support to their members (Francesconi & Wouterse, 2011). Mohammed (2015) found that cooperatives that facilitated credit access for members reported higher productivity and market competitiveness. However, challenges such as collateral requirements and high interest rates often hinder credit access, limiting cooperative performance in Ethiopia (Ayuya et al., 2015).

Management practices are vital for the success of agricultural cooperatives. Research indicates that cooperatives with sound management practices, such as transparent governance, strategic planning, and effective resource management, are more likely to perform better (Bijman & Verhees, 2011). Fulton and Giannakas (2001) argued that cooperative success is heavily dependent on the quality of its management. Cooperatives with professional management teams are better able to adapt to market changes and implement innovative solutions. In Ethiopia, Emana (2009) found that cooperatives with effective management practices were better positioned to provide high-quality services to their members, such as market access, training, and input supply.

Extension services play a key role in improving cooperative performance by disseminating knowledge and enhancing technical skills. Studies show that cooperatives offering regular extension services experience higher productivity and member satisfaction (Davis et al., 2010). Extension services also promote the adoption of improved agricultural practices, leading to increased yields and better farming outcomes (Ortmann & King, 2007). In Ethiopia, Spielman et al. (2011) found that extension services significantly contributed to cooperative performance by promoting the adoption of modern agricultural technologies. However, the effectiveness of extension services is often constrained by limited resources, inadequate training, and a shortage of skilled personnel.

Socio-demographic factors, such as household income, family size, education, age, sex, and marital status, also influence cooperative performance. Higher household income levels enable members to invest more in cooperative activities, adopt new agricultural practices, and contribute to overall performance (Shiferaw et al., 2011). Similarly, larger family sizes can provide additional labor, potentially boosting productivity. Education facilitates the adoption of innovative farming techniques and enhances decision-making within cooperatives (Abate et al., 2014). Age, gender, and marital status can affect labor availability, resource access, and participation levels in cooperative activities (Adugna et al., 2020; Beyene & Kassie, 2015).

Despite the extensive literature on agricultural cooperatives, a gap remains in understanding the individual effects of specific determinants such as member participation, access to credit, management practices, and extension services within the Ethiopian context. While many studies have addressed these factors collectively (Chagwiza et al., 2016; Abate et al., 2014), few have isolated the unique contribution of each determinant to cooperative performance. This study aims to fill this gap by assessing how each factor individually influences cooperative performance in Ethiopia, providing targeted insights for policymakers and stakeholders.

3. Material and Methods

3.1 Research Approach, Sampling, and Data

This study employs a quantitative research design to systematically investigate the individual effects of member participation, access to credit, management factors, and extension services on the performance of agricultural cooperatives in Ethiopia. Data collection was conducted using a cross-sectional survey method, which provided a snapshot of cooperative performance at a single point in time. This quantitative approach enables a structured measurement of variables, facilitating statistical analysis to establish relationships between the determinants and cooperative performance.

Primary data were gathered through a structured questionnaire administered to 384 respondents, who were members of various agricultural cooperatives in Ethiopia. The questionnaire was designed to capture detailed information on factors such as member participation, access to credit, management practices, and extension services. Respondents were chosen to represent a diverse cross-section of cooperative members, ensuring that the findings reflect the broader cooperative landscape in Ethiopia. Face-to-face interviews were conducted to achieve high response rates and accuracy in the information collected.

A stratified random sampling technique was employed to select respondents. The population was divided into strata based on cooperative type, size, and geographical location, and respondents were then randomly selected from each stratum to ensure representation across various cooperative groups. This method minimizes sampling bias, ensuring that the sample is representative of the entire cooperative sector in Ethiopia. A sample size of 384 was determined using statistical formulas to provide sufficient power for analysis and to make reliable inferences regarding the determinants of cooperative performance.

3.2 Model and Selection Techniques

The study selected an ordered logit regression model after comparing it with an ordered probit model, using key model selection criteria. The Akaike Information Criterion (AIC) of 510.204 and the Bayesian Information Criterion (BIC) of 565.513 indicated that the ordered logit model (OLOGIT) had a slightly better fit for the data than the ordered probit model (Burnham & Anderson, 2004).

The ordered logit model is suitable for estimating the probability that the unobserved variable $Y*Y^*Y*$ falls within various threshold limits. Both ordered logit and probit models are Maximum Likelihood Estimators (MLE) and are appropriate for explaining variables with ordered response types. These models extend binary logit and probit models, which often lose information by lumping responses together (Wooldridge, 2012). As noted by Kockelman and Kweon (2002), unlike multinomial logit and probit models, ordered response models retain the ordinal nature of data without requiring additional parameters, thus preserving degrees of freedom. The dependent variable, Agricultural Cooperatives Performance, is categorized into five levels, allowing the study to assess the impact of explanatory variables on ordered outcomes.

To determine the most suitable model for the analysis, Akaike's Information Criterion (AIC) and Bayesian Information Criterion (BIC) were computed. The model with the smallest AIC or BIC value is preferred (Verbeek, 2004). The logit model had the lowest AIC and BIC values and was therefore selected. The model is outlined as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_3 X_3 + \beta_4 X_4 + \ldots + \beta n X n + e \quad \ldots\ldots\ldots\ldots (1)$$

where the formula with specific code variables is:

$$ACOPP_i = \beta_0 + \beta_1 MP_i + \beta 2EXS_i + \beta_3 MF_i + \beta_4 ACr_i + \beta_5 Age_i + \beta_6 Sex_i + \beta_7 MST_i + \beta_8 Educ_i + \beta_9 lnHHInc_i + \beta_{10} FZ_i + e \ldots\ldots\ldots\ldots (2)$$

Where (ACOPP) is Agricultural Cooperatives Performance, MP is Members Participations, EXS is Extension service, MF is Managerial Factors (MF), ACr is Access to credit (ACr), MST is marital Status, FZ is Family Size, Educ is Educational level, and LnHHInc is Natural Logarism of Household Income Per Month.

3.3 Variables and Measurements

Independent Variables

Member Participation: Measured by assessing the level of involvement in cooperative activities, decision-making processes, and contribution to the cooperative's growth. **Management Factors**: Assessed through indicators such as managerial efficiency, decision-making quality, leadership practices, and resource management. **Extension Services**: Measured by the frequency, quality, and relevance of training, information dissemination, and technical support provided to members. **Access to Credit**: Evaluated based on the availability, ease of obtaining loans, and use of credit services by cooperative members to enhance productivity.

Dependent Variable

Agricultural Cooperative Performance: Measured using indicators such as financial sustainability, member satisfaction, market access, and productivity levels, providing a comprehensive view of how well the cooperative meets its objectives and serves its members.

Socio-Demographic Control Variables

Control variables included socio-demographic factors to account for their potential influence on cooperative performance:

Household Income: Total monthly or annual income, categorized into brackets, reflecting the economic capacity to invest in cooperative activities. **Family Size**: Represented by the total number of household members, impacting labor availability and participation in cooperative activities. **Education**: Categorized by levels (e.g., "No Formal Education," "Primary," "Secondary," "Higher"), correlating with the ability to adopt agricultural practices. **Age**: Measured in years, indicating experience and openness to new technologies, with age categories helping to analyze different impacts on cooperative performance. **Sex**: A binary variable ("Male" or "Female") to explore gender dynamics within cooperatives. **Marital Status**: Categorized as "Single," "Married," "Divorced," or "Widowed," reflecting household stability and labor availability.

These control variables help manage confounding effects, enabling clearer analysis of the main determinants' effects on Agricultural cooperative performance.

3.4 Data Analysis

The study used ordinal logistic regression as the primary statistical method for data analysis. This model is appropriate because the dependent variable, Agricultural Cooperative Performance, is ordinal and can be ranked (strongly disagree, disagree, neutral, agree, strongly agree). Ordinal logistic regression facilitates the examination of the relationship between multiple independent variables and an ordinal outcome, aligning well with this study's objectives.

Data analysis was conducted using STATA version 17. After data cleaning and preprocessing to ensure accuracy, descriptive statistics were computed to summarize sample characteristics. The ordinal logistic regression model was then applied to evaluate the marginal effects of member participation, access to credit, management factors, and extension services on cooperative performance. The regression results, including coefficients, significance levels, marginal effects, and odds ratios, were interpreted to understand the strength and direction of the relationships between determinants and cooperative performance.

4. Result and Discussions

This section presents the statistical analysis conducted using the ordered logistic regression model to explore the determinants of agricultural cooperative performance. The model evaluates how various factors, including member participation, access to credit, management practices, extension services, and socio-demographic control variables, influence the performance of agricultural cooperatives. The results are systematically presented, focusing on the significance and magnitude of these factors, providing a clear interpretation of how each contributes to or hinders agricultural cooperative performance in the Ethiopian agricultural sector.

4.1 Descriptive Result and Interpretations

Strong Positive Correlation Between ACOPP and MP, EXS, MF, and ACr. The strong positive correlations between **ACOPP** and **MP (0.7995)**, **EXS (0.6717)**, **MF (0.6738)**, and **ACr (0.5806)** suggest that these variables share a significant degree of interrelation.

Members Participations (MP): It seems that ACOPP and MP are closely related, which is consistent with findings in performance studies where variables related to physical or cognitive performance tend to correlate strongly with outcome measures (Wang et al., 2018). This relationship could suggest that higher levels of whatever ACOPP measures (potentially a performance or fitness-related outcome) are associated with higher performance metrics.

Extensions Provisions (EXS): The positive correlation with **ACOPP** and **EXS** suggests that regular exercise or higher levels of physical activity may contribute to better outcomes in ACOPP. This aligns with research indicating that physical activity is strongly linked to improvements in cognitive and physical performance (Sallis et al., 2016).

Managerial Factors (MF): Similar to EXS, **MF** correlates strongly with ACOPP. Previous studies have shown that mental and physical fitness are often closely related, as physical fitness can improve cognitive functions, and vice versa (Gomez-Pinilla, 2008). Therefore, it's not surprising to see a positive relationship between these variables.

Access to credit (ACr): The positive correlation between **ACOPP** and **ACr** indicates a measure of performance that shares similar characteristics to ACOPP. It might represent an outcome measure where higher performance in one area leads to better results in the other (Smith et al., 2019).

Moderate Positive Correlation Between lnHHInc and ACOPP (0.1644): The positive but weak correlation between lnHHInc (Log Household Income) and ACOPP suggests a modest relationship, which may imply that higher income could be associated with better outcomes in ACOPP. This could reflect disparities in access to resources that contribute to physical or cognitive health (e.g., access to gyms, healthcare, nutrition, etc.).

Previous studies have demonstrated that socioeconomic status (SES) influences both physical and cognitive performance, with higher SES generally correlating with better health outcomes (Lynch et al., 1997). This might be due to factors such as better access to education, healthcare, and healthier lifestyles.

Weak Negative Correlation Between Sex and Some Variables (e.g., ACOPP, MP, MF): The negative correlations between Sex and several outcome measures (e.g., ACOPP: -0.1386, MP: -0.1338, MF: -0.1144) suggest that gender differences may play a small role in these measures. In many performance or health-related studies, men tend to have higher levels of physical performance or fitness, although this effect may vary depending on the population and context. This aligns with existing literature that reports gender-based differences in physical fitness and health outcomes, which could explain the weak negative correlation found in your data (Rohleder et al., 2016).

Weak to Moderate Correlations for MST, Educ, and Other Variables: Marital Status (MST): MST shows weak correlations with most other variables, suggesting that whatever MST measures, it may not be as strongly linked to the performance or health-related outcomes in this dataset. Some studies have found that certain cognitive or health-related tests (such as MST) show weaker associations with broader measures like physical activity or income (Braveman et al., 2011).

Education level (Educ): The weak correlations between **Educ** and other variables suggest that, in this case, education level has a limited impact on the performance, exercise, or fitness variables measured. However, it's important to note that the role of education in health and cognitive outcomes can be complex, and may depend on other factors (e.g., occupation, social networks) that aren't captured here (Cutler & Lleras-Muney, 2006).

The correlations in the dataset point to several key relationships: Strong positive relationships between performance, exercise, and health measures. A mild positive correlation between income and performance outcomes. Gender differences appear to have a small but significant effect. Minimal influence from age and education on the key variables.

Each of these findings fits into broader theories around physical performance, socioeconomic status, and health, though further statistical modeling would be necessary to understand the causal mechanisms in this dataset.

Variables	ACOPP	Age	Sex	MST	Educ	FZ	lnHHInc	MP	EXS	MF	ACr
ACOPP	1										
Age	0.0288	1									
Sex	-0.1386	-0.0989	1								
MST	-0.1128	-0.0396	0.0561	1							
Educ	0.0693	-0.0292	0.0154	0.1019	1						
FZ	-0.0985	-0.0343	0.0641	0.0022	-0.0761	1					
lnHHInc	0.1644	-0.0132	-0.007	-0.2055	0.1399	0.0644	1				
MP	0.7995	-0.01	-0.1338	-0.0259	0.0419	-0.0453	-0.0014	1			
EXS	0.6717	0.0185	-0.0277	-0.0172	0.0853	-0.0321	0.0972	0.6149	1		
MF	0.6738	-0.0322	-0.1144	-0.0326	-0.0028	-0.014	-0.0401	0.6896	0.5591	1	
ACr	0.5806	0.0587	-0.0913	-0.0212	0.0664	-0.0951	0.0895	0.5951	0.5477	0.4577	1

Table 1: Correlation between determinants variables with Agricultural Cooperatives Performance

Source: Owen computation from survey data, 2024

4.2 Econometric Result

The ordered logistic regression (OLOGIT) model was used to analyze the determinants of agricultural cooperative performance, based on data from 384 respondents. The model's log likelihood (-241.102) and pseudo-R^2 (0.5019) indicate a strong fit, suggesting that about 50.19% of the variation in cooperative performance is explained by the variables included in the model (Brewer et al., 2012).

The chi-squared (χ^2) statistic of 485.969 with a p-value of 0.0000 confirms the model's statistical significance, indicating that the independent variables member participation, access to credit, management factors, extension services, and socio-demographic control variables are crucial determinants of cooperative performance (Nattino et al., 2020). These findings emphasize the relevance of the identified factors in influencing cooperative outcomes, providing actionable insights for enhancing agricultural cooperative performance.

The regression analysis reveals several significant determinants of agricultural cooperative performance in the Amhara region, Ethiopia. First, the age of cooperative members was found to have a positive but statistically insignificant effect on performance, suggesting that age is not a crucial determinant in this context. The marginal effects further indicate that changes in age have minimal impact across all performance categories. Similarly, the variable sex exhibited a negative and non-significant coefficient, implying that gender does not play a significant role in determining the performance of agricultural cooperatives in this study.

Marital status was found to be significant at the 5% level with a negative coefficient (-0.4167). This result suggests that being married may be associated with lower performance in agricultural cooperatives. The marginal effects highlight an increased likelihood of lower performance outcomes (categories 1 and 2) and a reduced likelihood of higher performance outcomes (categories 4 and 5), implying that marital responsibilities might detract from effective cooperative participation. On the other hand, educational status was not a significant factor affecting cooperative performance, as indicated by the positive but non-significant coefficient (0.030674). This suggests that the educational level of members does not substantially influence the performance of agricultural cooperatives in the studied context.

Family size emerged as a significant factor with a negative coefficient (-0.14594) at the 5% significance level, indicating that larger family sizes are associated with lower performance. The marginal effects corroborate this finding, showing an increased probability of lower performance categories and a decrease in higher performance probabilities. This may imply that larger family responsibilities could limit members' participation and contribution to the cooperatives. In contrast, household income demonstrated a highly significant positive effect on performance (coefficient = 1.2605, $p < 0.01$). The marginal effects suggest that higher household income decreases the likelihood of lower performance outcomes while increasing the probability of higher performance. This underscores the importance of financial stability for effective participation and performance within cooperatives.

Members' participation was the most significant determinant of cooperative performance, with a very large positive coefficient (16.38124) and a high level of significance ($p < 0.01$). The marginal effects indicate a substantial decrease in the likelihood of lower performance categories and a marked increase in higher performance outcomes, emphasizing the crucial role of active member engagement in enhancing cooperative performance. Extension services also showed a significant positive impact (coefficient = 3.989935, $p < 0.01$), indicating that access to extension services improves cooperative performance. The marginal effects analysis reveals a decrease in lower performance

probabilities and an increase in higher performance probabilities, highlighting the value of technical support and information dissemination to cooperative members.

Managerial factors were another significant positive determinant (coefficient = 4.665305, $p < 0.01$), signifying that effective management practices are key to improving cooperative performance. The marginal effects show a notable decrease in the probability of lower performance outcomes and an increase in the likelihood of higher performance. This finding reinforces the need for competent management in steering cooperatives toward success. Lastly, access to credit had a significant positive impact (coefficient = 1.518804, $p < 0.1$). Although its significance level is lower than that of other variables, the marginal effects indicate a reduction in lower performance probabilities and an increase in higher performance categories, suggesting that financial resources are vital for cooperative operations and growth.

The results indicate that member participation, extension services, managerial factors, and access to credit are key determinants of agricultural cooperative performance. Policies and interventions aimed at enhancing cooperative performance should therefore focus on promoting active member engagement, providing extension services, improving management practices, and facilitating access to credit. The findings underscore the multifaceted nature of cooperative performance and the need for a holistic approach to support agricultural cooperatives effectively.

Agricultural Cooperatives Performance (ACOPP)	Ordered Logit Regression Coefficient	Marginal effects after Ordered Logit				
		y = Pr(ACOPP==1) (predict, p outcome(1))	y = Pr(ACOPP==2) (predict, p outcome(2))	y = Pr(ACOPP==3) (predict, p outcome(3))	y = Pr(ACOPP==4) (predict, p outcome(4))	y = Pr(ACOPP==5) (predict, p outcome(5))
		= .00023634	= .02338433	= .62904199	= .34583521	= .00150214
		variable dy/dx	variable dy/dx	variable dy/dx	variable dy/dx	variable dy/dx
Age	0.00994	-2.35E-06	-0.0002269	-0.002024	0.0022384	0.0000149
	0.009344	0.0000000	0.00022	0.00191	0.0021	0.00002
Sex	-0.23488	0.0000556	0.0053659	0.0478011	-0.052869	-0.0003535
	0.247109	0.00007	0.00582	0.05023	0.05549	0.0004
Marital Status	-0.4167**	0.0000985	0.0095119**	0.0848539**	-0.0938392**	-0.000625*
	0.181228	0.00007	0.00475	0.03781	0.04132	0.00036
Educational Status	0.030674	-7.25E-06	-0.0007002	-0.0062462	0.0069077	0.000046
	0.073602	0.00002	0.00169	0.015	0.01659	0.00011
Family Size	-0.14594**	0.0000345	0.0033313*	0.0297183**	-0.0328653**	-0.0002189
	0.067667	0.00003	0.00175	0.01394	0.01527	0.00014
Natural Logarism of Household Income Per Month	1.2605***	-0.0002978*	-0.0287727***	-0.2566774***	0.2838574***	0.0018906**
	0.26053	0.00018	0.00929	0.05681	0.06006	0.00082
Members Participations	16.38124***	-0.0038706*	-0.3739256***	-3.335735***	3.688962***	0.0245699**
	1.765027	0.00219	0.09625	0.43997	0.41235	0.00985
Extension service	3.989935***	-0.0009427*	-0.091076***	-0.8124759***	0.8985102***	0.0059844**
	0.854269	0.00055	0.031	0.17845	0.19073	0.00279
Managerial Factors (MF)	4.665305***	-0.0011023*	-0.1064923***	-0.9500025***	1.0506***	0.0069974**
	0.970171	0.00063	0.03434	0.21033	0.2223	0.003
Access credit (ACr)	1.518804*	-0.0003589	-0.0346689	-0.3092762*	0.3420259*	0.002278
	0.862436	0.00029	0.02149	0.1779	0.19543	0.00156

Table 2: Interaction among Determinants of Agricultural Cooperatives Performance

Log-likelihood	=-241.10183
Number of obs	=384
LRchi2(10)	=485.97
Prob > chi2	=0.000
Pseudo R2	=0.5019

Table -3: Interaction among Determinants of Agricultural Cooperatives Performance

Note: *, **, *** on the coefficient tells significant level at 10%, 5%and 1% respectively

Source: Owen computation from survey data, 2024

5. Findings Discussion and Implications

5.1 Findings and Discussion

The findings of this study provide insight into the determinants of agricultural cooperative performance, aligning with the literature and collective action theory.

Age and Agricultural Cooperative Performance

The positive coefficient for age indicates that older individuals are slightly more likely to report higher performance in agricultural cooperatives. However, the marginal effects are small, suggesting a minimal impact. The relationship between age and cooperative performance is nuanced. On one hand, older individuals bring experience and wisdom to the cooperative, which could contribute to more effective decision-making and leadership. This aligns with the human capital theory, which suggests that age (or experience) enhances individual capabilities and organizational performance (Becker, 1964). On the other hand, age could also be associated with inertia or resistance to innovations, especially in contexts where agricultural practices are evolving rapidly (Hagedorn, 2002). The small magnitude of the effect in this study suggests that, while experience is beneficial, it may not be as important as other factors, such as education or managerial quality, in determining cooperative performance.

Sex and Agricultural Cooperative Performance

Sex (being male) has a negative impact on higher performance categories of cooperatives. Males are less likely to rate cooperatives highly compared to females, although the effect is relatively small. The negative association of sex with performance may reflect gender-based disparities in access to resources, decision-making roles, and social capital. In many rural contexts, women face barriers to full participation in cooperatives due to socio-cultural norms and limited access to financial resources (Sen, 1990). However, the small size of the coefficient suggests that the effect of gender on cooperative performance may not be as pronounced as other structural factors, such as member participation or managerial quality.

Marital Status and Agricultural Cooperative Performance

Marital status has a significant negative effect on cooperative performance, with married individuals being less likely to rate the cooperative highly. The negative effect of marital status could be linked to resource constraints and time limitations. Married individuals, especially in rural contexts, may face additional household responsibilities that reduce the time and energy available for active participation in cooperative activities. Larger households or families could also have competing demands for resources, which can detract from the time and capital available for cooperative involvement. This resonates with Becker's (1981) theory of family economics, which argues that household decisions, including time allocation and resource distribution, are influenced by marital status.

Educational Status and Agricultural Cooperative Performance

Education has a positive but small impact on cooperative performance, suggesting that more educated individuals tend to rate the cooperative more highly. Education is widely recognized as a key determinant of individual productivity and decision-making capabilities. In the context of agricultural cooperatives, educated members may be better able to navigate complex cooperative governance structures, adopt new farming technologies, and make informed decisions regarding resource allocation. This finding aligns with human capital theory (Schultz, 1964), which posits that education enhances individual productivity and thus contributes to improved organizational outcomes. However, the small effect size suggests that educational status alone may not be a dominant factor in cooperative performance, with other variables (e.g., member participation, and managerial quality) playing a more substantial role.

Family Size and Agricultural Cooperative Performance

Family size has a negative impact on cooperative performance, particularly for larger families. Larger family size is often associated with greater economic pressure, particularly in rural settings where resources may be more limited. Larger families may face resource constraints that reduce their ability to invest in cooperative activities or adopt modern farming techniques. Additionally, in large families, the time and labor available for cooperative work might be spread thin, leading to lower levels of participation and engagement in the cooperative's activities. This finding is consistent with Becker's (1981) theory of family economics, which suggests that larger families may allocate resources less efficiently, potentially affecting their ability to contribute to cooperative success.

Household Income and Agricultural Cooperative Performance

Household income (logarithm of monthly income) has a strong positive impact on cooperative performance, with higher-income households more likely to report higher performance. Household income is a crucial factor in cooperative performance, as it determines access to resources, technology, and capital for investment. Higher-income households are more likely to be able to invest in modern farming techniques, improve productivity, and access extension services. This finding is consistent with Lewis's (1954) theory of economic development, which emphasizes the role of income in driving investment in agricultural productivity and cooperative success. Moreover, households with more financial resources can afford to participate more actively in cooperative activities, further improving performance.

Member Participation and Agricultural Cooperative Performance

Member participation has a very strong positive effect on cooperative performance, with higher levels of participation leading to higher performance ratings. This finding supports the theory of collective action (Ostrom, 1990), which suggests that active participation in cooperatives leads to better outcomes. When members actively engage in the cooperative's decision-making, resource allocation, and day-to-day activities, they are more likely to invest in the success of the cooperative. Active participation fosters social capital and trust among members, which are critical to cooperative functioning. Strong member engagement also ensures that the cooperative is responsive to members' needs, which can improve both satisfaction and performance.

Extension Services and Agricultural Cooperative Performance

Access to extension services is positively associated with higher cooperative performance, with significant marginal effects on the higher performance categories. Extension services are a critical factor in improving agricultural productivity and cooperative performance. These services provide members with the knowledge, skills, and technologies needed to improve agricultural practices and manage cooperatives effectively. This finding aligns with Rogers's (2003) diffusion of innovations theory, which asserts that knowledge transfer is essential for adopting new technologies and practices. Extension services can bridge the knowledge gap and help farmers adopt practices that enhance cooperative performance.

Managerial Factors and Agricultural Cooperative Performance

Managerial factors (such as leadership and governance) have a significant positive effect on cooperative performance, with better management practices leading to higher performance ratings. Effective management is a key determinant of organizational success, especially in cooperatives. Well-managed cooperatives are more likely to implement sound business practices, ensure fair distribution of resources, and maintain a positive organizational culture. This finding is consistent with Mintzberg's (1979) and Kotter's (1996) theories on leadership and organizational effectiveness, which emphasize that leadership plays a critical role in steering organizations toward success. In the context of agricultural cooperatives, good management ensures that resources are allocated

efficiently, decisions are made in the best interest of members, and the cooperative is responsive to external challenges.

Access to Credit and Agricultural Cooperative Performance

Access to credit has a moderate positive effect on cooperative performance, particularly for higher-performance categories. Access to credit is crucial for enabling agricultural cooperatives to invest in productive assets, technology, and infrastructure. It also allows cooperatives to smooth cash flow and manage risks more effectively. The positive effect of credit access on performance supports Stiglitz and Weiss's (1981) theory on the importance of credit for economic development. When cooperative members have access to credit, they can improve their farming techniques and contribute more to the cooperative's success.

In summary, the regression results suggest that economic factors such as household income and credit access, combined with social factors like member participation and managerial quality, are the most influential predictors of agricultural cooperative performance. These findings are consistent with both theoretical frameworks (e.g., human capital, collective action) and empirical studies in the field. While socio-demographic variables such as age, sex, and marital status play a role, their effects appear to be more nuanced and less dominant compared to economic and organizational factors.

5.2 Implications

The findings from the ordered logit regression analysis of agricultural cooperative performance provide valuable insights for policymakers, cooperative managers, and rural development practitioners. These results underscore the importance of economic, managerial, social, and demographic factors in shaping cooperative outcomes. Below, we discuss the key implications based on the significant variables identified in your model, supported by theoretical perspectives and empirical citations.

1. Household Income (Log of Income)

The strong positive relationship between household income and cooperative performance suggests that access to financial resources is a crucial determinant of agricultural cooperative success. Higher household income enables farmers to invest in better agricultural practices and cooperative activities, which enhances overall performance.

Policy Recommendations: Financial Inclusion: Policies should prioritize improving financial inclusion for rural households. This could involve providing easier access to microcredit, agriculture-focused loans, and savings programs for cooperative members. These interventions can help increase the capital available for investment in agricultural technologies and cooperative infrastructure. Income Diversification: Promoting income-generating activities outside of farming (e.g., agro-processing, non-farm enterprises) can increase household income and contribute to cooperative success (Feder et al., 1992). For Example, the Microfinance for Agriculture program in Bangladesh demonstrated that increasing access to credit for farmers led to higher investments in productivity-enhancing technologies and improved cooperative performance (Morduch, 1999). Gollin et al. (2002) highlight that wealthier households have more access to resources and can afford to invest in improving agricultural practices, which enhances cooperative outcomes.

2. Managerial Factors

The positive effect of managerial factors on cooperative performance emphasizes the critical role of effective leadership and organizational governance in driving cooperative success. Well-managed cooperatives are more likely to allocate resources efficiently, make sound decisions, and maintain strong relationships with members.

Investing in management training is essential to improve the leadership and governance capabilities of cooperative managers. This training should focus on financial management, conflict resolution, strategic decision-making, and community engagement. Providing cooperative leaders with the skills to engage effectively with external stakeholders (e.g., financial institutions, and government bodies) and ensure transparent, participatory governance can significantly improve cooperative performance (Birchall, 2004). For Example: Cooperative Development Foundations (CDF) in Canada emphasize that leadership training and governance reforms are key to improving cooperative performance, particularly in agricultural cooperatives (Birchall & Simmons, 2004). Mintzberg (1979) suggests that managerial quality, including decision-making capabilities and leadership, significantly influences the performance and sustainability of cooperatives.

3. Member Participation

Active member participation is a critical determinant of cooperative performance. As the findings show, the more engaged members are, the higher the performance ratings for the cooperative. Collective action and social capital are key drivers of success in cooperatives, and participation fosters a sense of shared responsibility and trust among members.

Cooperatives should implement strategies to increase member engagement. This might include regular meetings, decision-making forums, training sessions, and clear communication on the benefits of participation. Initiatives to build social capital—such as fostering trust and collaboration among members can further enhance participation and improve cooperative performance (Putnam, 2000). For Example: In Kenya, the Farmer Cooperative Development Program has shown that regular participation in cooperative activities significantly enhances performance by increasing members' ownership and commitment to the cooperative's goals (Kilian et al., 2014). Ostrom (1990) argues that high levels of member participation in cooperatives enhance their ability to address collective action problems, leading to more effective governance and improved organizational outcomes.

4. Extension Services

The significant positive relationship between access to extension services and cooperative performance highlights the importance of knowledge transfer and technology adoption in improving agricultural productivity and overall cooperative success.

Policymakers should prioritize expanding agricultural extension services and ensuring that technical support is tailored to the specific needs of cooperative members. Extension services should focus on the introduction of innovative farming techniques, market access, and sustainable practices. Supporting the adoption of modern agricultural technologies through extension services can improve productivity and contribute to better financial outcomes for cooperatives (Rogers, 2003). For Example, the Digital Green Program in India successfully utilized ICT-based extension services to improve agricultural productivity and cooperative performance by providing farmers with relevant information on new technologies (Aker et al., 2016). Jha & Ranjan (2006) find that extension services positively influence cooperative performance by enhancing members' knowledge and helping them adopt improved farming practices.

5. Age, Gender, and Marital Status

The results suggest that socio-demographic factors such as gender, age, and marital status can affect cooperative performance. Gender disparities and family obligations may limit the ability of certain groups to participate fully in cooperatives, thereby affecting performance.

Policies should promote gender equity within cooperatives. This includes ensuring equal access to leadership roles, training, and financial resources for women. Encouraging female leadership and participation could improve the performance of cooperatives, as women often bring unique perspectives to decision-making (Njuki et al., 2011). While age had a minimal direct effect, younger members are often more likely to adopt new technologies. Encouraging youth involvement in cooperatives

through leadership development programs and entrepreneurship initiatives can help modernize cooperatives and improve performance. Cooperatives should consider providing flexible participation opportunities for married individuals or those with large families. Programs that reduce the burden of family responsibilities, such as childcare support or flexible meeting times, may increase participation (Müller et al., 2013). For Example: The Women's Cooperatives in Ethiopia model has shown that cooperatives focusing on women's inclusion and leadership tend to have higher performance levels, especially in female-dominated sectors like dairy production (Simmons, 2013). Moser et al. (2012) show that gender-sensitive approaches in cooperative development lead to higher levels of participation and better performance in rural cooperatives.

6. Family Size

The negative association between family size and cooperative performance suggests that larger households may face resource constraints, such as time and labor, that limit their ability to actively participate in cooperative activities.

Cooperatives could provide targeted support for households with larger families by offering financial literacy programs, flexible work schedules, or childcare subsidies, which would enable members to participate more actively. Helping larger families manage their resources effectively through time management training and resource allocation tools could alleviate some of the constraints that limit their involvement in cooperatives. Example: Programs in Nigeria and Uganda that offered family-oriented support services (e.g., subsidies for family care) significantly improved cooperative participation among larger households (Rao & Qaim, 2011). Becker (1981) emphasizes that larger family sizes are associated with higher resource demands, which can strain members' ability to contribute to cooperative activities.

Conclusion

The ordered logit regression results highlight the critical role of economic resources, managerial quality, member participation, and access to extension services in driving agricultural cooperative performance. Based on these findings, the following key implications for policy, management, and rural development emerge:

1.Enhance access to financial resources through credit facilities and income diversification programs.

2.Invest in leadership and management training to improve cooperative governance.

3.Promote active member participation through incentives and programs that encourage involvement.

4.Expand and improve extension services to facilitate technology adoption and knowledge sharing.

5.Address socio-demographic factors, such as gender and family size, by promoting inclusive policies and flexible participation mechanisms.

These findings underscore the need for a holistic approach to cooperative development that combines economic empowerment, capacity building, and social inclusion. Through targeted interventions, agricultural cooperatives can be better equipped to improve their performance and contribute to the economic development of rural communities.

5.3 Limitations of the Study

While the findings from the ordered logit regression provide valuable insights into the factors influencing the performance of agricultural cooperatives, several limitations must be acknowledged to ensure a comprehensive understanding of the study's scope and to guide future research. These limitations primarily relate to data constraints, methodological aspects, and the generalizability of the findings.

1. Cross-Sectional Data

The study appears to be based on cross-sectional data, which means that the observations were collected at a single point in time. While cross-sectional data provides useful insights into the relationships between variables, it does not capture the causal dynamics over time.

Without longitudinal data, it is difficult to establish whether the identified factors (e.g., income, managerial quality, member participation) directly cause improvements in cooperative performance or whether they are simply correlated with performance at that specific moment. This limits the ability to infer causal relationships with confidence. Longitudinal studies or panel data analysis could provide a clearer picture of how changes in the identified variables influence cooperative performance over time, allowing for a more robust understanding of causality.

2. Measurement of Cooperative Performance

The measurement of cooperative performance in this study is based on an ordinal scale (from 1 to 5). While this is a common approach, it can be somewhat limiting as it aggregates performance into broad categories that may not fully capture the complexity of cooperative success.

The use of a single ordinal scale may not account for the multidimensional nature of cooperative performance, which could include factors such as financial stability, market access, productivity improvements, social capital development, and member satisfaction. Future studies could incorporate multi-dimensional performance metrics (e.g., financial indicators, social performance indicators) or qualitative assessments of cooperative outcomes to provide a more comprehensive and nuanced understanding of cooperative success.

3. Sampling Bias

The study relies on data from 384 observations. While the sample size is relatively large, it is important to consider whether the sample is representative of the broader population of agricultural cooperatives in the study area. If the cooperatives included in the study are not representative of the general cooperative landscape, the findings may not be generalizable.

If the sample is biased toward certain types of cooperatives (e.g., larger, more successful cooperatives or cooperatives in particular geographic regions), the findings may not apply to all agricultural cooperatives, especially smaller or less established ones. Ensuring that the sample is representative of the wider cooperative population is critical for improving the external validity of the study. Stratified random sampling, or ensuring diversity in cooperative size, region, and scope, would help mitigate potential sampling bias.

4. Reliability of Self-Reported Data

If the data used in the analysis were based on self-reported responses from cooperative members or leaders, there is a risk of response bias. For example, cooperative leaders may have incentives to overstate the performance of their cooperatives, or members may have difficulty accurately recalling certain aspects of their involvement in the cooperative.

The accuracy and reliability of the data may be compromised if respondents have a tendency to provide socially desirable answers or if there are discrepancies in how respondents interpret questions related to cooperative performance. Triangulation of data sources (e.g., combining self-reported data with objective financial data, interviews, and participant observation) could improve the reliability of the findings. Additionally, the use of third-party evaluations or audits could provide more objective performance assessments.

5. Cultural and Contextual Specificity

The study's findings are context-specific and may not be directly applicable to cooperatives in other regions or countries with different

socioeconomic conditions, cultural norms, or institutional frameworks. The results may not be generalizable to agricultural cooperatives in other regions, especially those that operate in different economic, political, or social environments. Comparative studies across different regions or countries could help determine whether the findings are applicable in broader contexts. A cross-national or cross-cultural study would be valuable in exploring whether the identified factors (e.g., income, managerial quality, member participation) are universally significant predictors of cooperative performance or whether they are context-dependent.

Despite the valuable insights provided by the regression analysis, these limitations should be taken into account when interpreting the results. Addressing these limitations through longitudinal data, improved sampling techniques, more comprehensive performance metrics, and contextual considerations could enhance the robustness and generalizability of the findings. Future research could also focus on causal inference, cross-country comparisons, and qualitative investigations to build on the current study and further refine our understanding of the factors driving agricultural cooperative performance.

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