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Cooperative Participation and the Perception Gap in Livestock Farmers' Quality of Life: Evidence from a Small African Economy

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ABSTRACT

Cooperatives in the primary sector have played an important role in increasing income, strengthening capacities, and empowering citizens, especially in less developed countries, where strong public institutions to promote quality of life are lacking. This research, applied to São Tomé and Príncipe, studies the reasons for joining livestock cooperatives and the benefits that members report receiving, and relates them to their perceived quality of life. Data from a sample of 106 breeders, who are currently active members of livestock cooperatives was used. A logit model relates the perception of change in quality of life to socio-demographic variables and cooperative action. Additionally, a multinomial logit was used to assess the alignment between perception in change in quality of life and tangible changes. The logit model shows that participating in cooperative decision-making has the strongest effect on the perception that a cooperative positively impacts members' quality of life. Access to credit, technical support, and provision of market information are the cooperative services that have a significant impact, being positive for all. The multinomial logit revealed the presence of two groups in the sample, the aligned and the optimists. For the aligned group, perceptions and tangible gains match, while for the optimists there is a perceived improvement

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in the quality of life, but without tangible gains. It seems that optimists value other dimensions such as knowledge, empowerment, and participation, resultant from engagement. To foster inclusive and lasting development, cooperative leaders and policy makers must consider both the tangible and intangible dimensions of quality of life, ensuring members feel not only materially supported, but also socially recognized and empowered.

Keywords: Africa; Livestock Cooperatives; Rural Development; Quality of Life; Subjective Well-Being

1. Introduction

The agricultural sector is a cornerstone of sustainable development due to its vital contribution to economic diversification, social inclusion, employment creation, food security, and environmental sustainability^[1]. In fragile economies, particularly in many African contexts, market dynamics alone often fail to ensure the viability of small-scale farming or the fair distribution of benefits. In such environments, cooperative initiatives may play a key role in fostering collective action and improving rural livelihoods. This directly advances the Sustainable Development Goals, namely, SDG 1, SDG 2, SDG 8, SDG 10, and SDG 12.

This is particularly relevant for São Tomé and Príncipe (STP), a small island and developing country where poverty, food insecurity, and underdeveloped infrastructure hinder the full potential of the primary sector. Despite favorable agroecological conditions, domestic livestock production meets only 59% of the country's demand for meat and dairy products^[2]. In this context, producers' associations and cooperatives have gained institutional recognition as strategic tools for strengthening rural production systems and enhancing food availability. The inverse relationship between norms of cooperation and development^[3] leads one to expect that cooperatives are likely to be effective in settings like STP.

While cooperatives' outcomes are widely recognized, their effects are not always uniformly perceived by members. Some producers may benefit from tangible improvements, such as increased production, yet report no change in their quality of life. This suggests that subjective perceptions, shaped by personal, social, or experiential factors, play a critical role in how cooperative impacts are internalized. To better understand this complexity, we integrate both objective and subjective dimensions of rural quality of life in our analysis, by

addressing the following research questions:

- How do the services provided by cooperatives influence producers' perceptions of quality of life?
- Which producer profiles are more likely to perceive positive outcomes from cooperative membership?
- What is the role of active participation in cooperative decision-making in shaping these perceptions?
- Why do certain producers believe that their quality of life has improved even when objective indicators do not indicate progress, and vice versa?

By integrating subjective and objective dimensions of rural development, this study contributes to a more nuanced understanding of how cooperatives affect not only the economic, but also the perceived quality of life of small-scale livestock producers in STP and similar African contexts. Furthermore, the article emerges as a tool that fills a research and knowledge gap. It focuses on the perception gap between objective and subjective measures, an understudied topic in cooperative studies. Moreover, by carrying out research in an understudied country, this article adds significant geographical and empirical value.

2. Literature Review

In the current liberal framework, cooperatives are characterized by the principles of inclusiveness, democracy, and solidarity, with the primary objective of serving the interests of their members, who govern them^[4]. From the several theoretical frameworks relevant to understanding the outcomes of these organizations, we highlight contributions from microeconomics, social capital and empowerment theories, and the capability approach.

Microeconomics explains how, through the utilization of shared resources and the increase in scale, co-

operatives in primary sector can enhance production, boost productivity, amplify bargaining power, foster innovation, enable access to credit and reduce transaction costs. Economics also explains the channels through which technical training and support enhance production and productivity. Empirical research has found evidence of these direct economic benefits^[5,6], and of improvements in cooperative members' living conditions, related to housing, healthcare, and education access^[7] and greater annual consumption expenditure per equivalent adult^[8].

The basic premise of the social capital theory is that a network provides value to its members by facilitating them access to the social resources that are embedded within the network. A network inherently exists in cooperatives, and group relations are institutionalized. Assemblies' meetings, training sessions, technical support and other regular contacts stimulate members to communicate and interact. Research shows that this interpersonal contact has the potential to deepen mutual trust, expand social capital (interdependence, reciprocity, feeling of belonging, social recognition, etc.) and by this way improve well-being^[9].

The capability approach is based on the premise that freedom to achieve well-being is of primary moral importance and well-being should be understood in terms of people's capabilities and functioning. A capability depends on personal, sociopolitical, and environmental conditions. Cooperatives help the poorest to develop collective capabilities through which they can empower themselves^[10]. This falls in line with the empowerment theory that emphasizes the importance of individuals and communities actively participating in decision-making processes and having control over their lives^[11]. By being involved in the cooperative's operations, members gain skills to increase self-confidence and attain independence leading to improved well-being and a stronger social fabric within the community^[12]. Moreover, they add dynamism to the economy, by providing training and capacity-building programs, promoting knowledge transfer, and facilitating market access. Overall cooperatives contribute to the economic development^[13] and generate positive social externalities in local communities.

Additionally, by promoting sustainable agricultural practices, cooperatives play a crucial role in promoting resilience to external shocks such as climate change and disease outbreaks^[14], contributing to the overall stability and sustainability of livestock production systems in African countries. Enhancing security is part of the fight against human poverty.

Undoubtedly, cooperatives face challenges that can jeopardize their success^[15]. Challenges may appear across domains like governance, social capital, availability of financial and material resources, and operational aspects. Concerning governance, a competent managerial board, a well-defined strategy, and transparency are crucial to promote confidence and engagement^[16,17]. If it fails, members will not recognize the significance of the cooperative for themselves and society, which hampers their commitment^[17]. The level of farmers' willingness to participate in cooperatives is influenced by various factors. Wu et al.^[9] provide a comprehensive analysis of these factors, emphasizing aspects related to sociodemographic characteristics (gender, age, education, main sources of income, the number of family laborers, and time spent working on the farm), business characteristics (size of their farms, the main products, and the extent to which they engage in commercial activities), external market factors (e.g., price fluctuations) and services provided by the cooperative, namely training.

The analysis above makes clear that focusing only on economic effects of cooperative membership is not enough. Especially in low-income and rural settings, subjective quality of life is often a more meaningful and context-sensitive indicator than formal economic metrics^[18,19] and due to numerous interplaying factors, subjective and objective outcomes do not always converge. Producers may report no improvement in their quality of life despite experiencing tangible gains. This perception gap has been observed suggesting that perceived quality of life is shaped not only by material conditions but also by expectations, social comparisons, cultural values and relational dynamics^[20,21]. This means that practical benefits alone may not be sufficient to generate perceived improvements unless they are accompanied by empowerment, a sense of ownership, and meaningful participation in collective decision-making. Donkor

and Hejkrlik^[22] show that members more actively engaged in cooperative governance report stronger perceived benefits. Bhuyan and Karantininis^[23] go further to propose a virtuous cycle in which participation enhances satisfaction, which boosts motivation and reinforces future engagement. This is in line with the capability approach that recognizes participation has a key instrumental value for sustainable human development. Understanding this interplay between objective progress and subjective perception is essential for evaluating the true effectiveness of cooperative models particularly in under-researched settings such as STP.

3. Methodology

3.1. Sampling and Data Collection

This research targeted animal breeders who are members of a producers' cooperative or association and have not defaulted on quota payments. Producers were selected by purposive sampling methods, entailing the intentional choice of individuals with appropriate expertise and experience. Random sampling was infeasible in this context because there is no complete or updated list of livestock cooperative members in STP, and many producers operate informally or in geographically dispersed rural areas, making randomization logistically and financially impractical. These sampling techniques concentrate on individuals who are readily accessible and willing to engage in the study, thereby optimising the use of scarce resources^[24]. Hence, instead of trying to survey a large population, we focused on a smaller, diverse, and more accessible group that could provide valuable insights into our research. To mitigate potential bias, several measures were taken. The sample included members from cooperatives throughout São Tomé Is-

land, representing different livestock species and socio-demographic profiles. Local technicians and cooperative staff assisted in selecting participants to ensure balanced representation and reduce researcher subjectivity. Furthermore, the study focuses on within-group relationships among cooperative members rather than population-wide inference, which helps limit the influence of non-random selection on the validity of findings. Purposive sampling has been commonly used in empirical rural studies, especially when conducted in Africa^[25-27]. According to Dudovskiy^[28], this technique offers two key benefits. Firstly, it is cost-effective and timesaving. Secondly, it is particularly useful when there is limited existing data for the research. However, this non-probability sampling method has inherent disadvantages, including the possibility of researcher bias and a lack of representation of the larger population. As a result, the findings are analytically generalizable, providing in-depth insights into the examined context, rather than statistically generalizable to a larger population^[28].

A structured questionnaire designed by the authors was used to collect the primary data. The first version was subject to a pilot test with experts in the field. Based on their feedback minor changes were made to get the final version. The questionnaire comprised 29 questions focusing on socio-demographic profile, livestock species, reasons for joining the cooperative, perceived benefits, expectations about cooperatives and foreseen challenges. The survey was conducted on-site, by one of the authors, between June and August 2023.

The sample includes 106 producers, members of 24 cooperatives/associations, distributed across the six districts of São Tomé Island, 5 from the North, 8 from the Centre and 11 from the South. The main socio-demographic characteristics of the sample are summarised in **Table 1**.

Table 1. Descriptive statistics.

	Mean	S.D.	Min.	Max.
Age (years)	45.4	11.4	15	70
Gender (1 if female) (*)	0.377		0	1
Marital status (not single) (*)	0.698		0	1
Household size (number)	5.2		1	12
Education Level (*)				
None	0.075		0	1
4 years	0.160		0	1
6 years	0.302		0	1
9 years	0.179		0	1
12 years	0.104		0	1

Table 1. Cont.

	Mean	S.D.	Min.	Max.
Higher Education	0.179		0	1
Experience in animal farming (years)	11.1	9.2	1	40
Main source of income (1 if agriculture/animal husbandry) (*)	0.604		0	1
Income perception (*)				
It's very difficult to live on disposable income	0.151		0	1
Difficult to live on disposable income	0.462		0	1
Disposable income is enough to live on	0.321		0	1
Disposable income allows to live comfortably	0.066		0	1

(*) For binary variables the mean corresponds to relative frequency, standard deviations are omitted.

relative frequency, standard deviations are omitted.

Average age of respondents is 45 and men represent 62%, which aligns with the greater representation of men in the country's livestock sector. The average household size is 5 people. Most producers have a limited educational background, but possess extensive expertise in animal husbandry, with experience ranging from 1 to 40 years. Furthermore, animal farming represents the primary source of income for a significant proportion of the sample (60%). Most of the respondents (61%) consider it difficult or exceedingly difficult to maintain their livelihoods with their disposable income. The absence of official statistical data regarding the animal farming population within STP, prevent us from evaluating the precise alignment of the sample with the broader population. However, it is posited that the selected sample effectively captures diverse perspectives pertinent to understanding the multifaceted impact of cooperatives on the quality of life of farmers and their communities.

Regarding livestock, the sample includes breeders of cattle, pigs, sheep, goats, ducks and chickens. Poultry farming is the most prevalent, comprising 62% of breeders, half of whom do not raise other livestock. The sample includes four cattle breeders, seven sheep breeders, and thirteen goat breeders. The conditions for poultry raising are quite favourable, while the country's small size prevents farmers from maintaining large herds of livestock.

All procedures performed in this study involving human participants were conducted in accordance with the ethical standards outlined in the Declaration of Helsinki (1964) and its subsequent amendments. All the participants were verbally informed of the study's objectives, the voluntary nature of their participation, the method of data collection, and the confidentiality of their

responses prior to data collection. Respondents were reminded that there were no right or wrong answers and that they could stop responding to the survey at any time. Informed consent was obtained orally.

The study was not submitted for approval by the institution's Ethics Committee because no sensitive or personally identifiable data would be collected. All data were anonymized and aggregated in a way that prevents the identification of individual participants.

3.2. Data Analysis

Data were analysed using Stata 18.0. Descriptive statistics were first used to characterize the sample and to explore general perceptions, motivations, and challenges. These descriptive insights laid the groundwork for two econometric models designed to examine the drivers of perceived cooperative impact.

Given the relatively small sample size (N = 106), particular care was taken to minimize the risk of model overfitting. The number of explanatory variables was restricted to theoretically justified factors, and multicollinearity diagnostics (mean VIF = 1.35) confirmed low correlation among predictors. Model robustness was also verified by re-estimating models after excluding specific variables and outliers, yielding consistent results.

Logit Model

The first model, designed to identify the determinants of producers' perceived quality of life, is a binary logistic regression in which the dependent variable (Qualitylife) equals 1 if the respondent believes cooperative membership improves household quality of life and 0 otherwise. The explanatory variables include four key cooperative services (technical support, training, market information, and credit access), as well as a set of

control variables such as socio-demographic characteristics (age, gender, education, and income), herd evolution (Livestockvar), and cooperative decision-making participation. Participation was measured through a self-reported binary variable, coded as 1 if the respondent actively participates in cooperative meetings and collective decision-making, and 0 otherwise. While this

measure indicates whether a member is engaged in governance and participatory processes, it does not capture variation in attendance frequency, leadership roles, or informal contributions. The model structure (Table 2) reflects the theoretical assumption that service access and member agency both influence how cooperative impacts are internalized by members.

Table 2. Variables description.

Variables	Description
Dependent variable	
Qualitylife	1 if improvement in quality of life of household is perceived; 0 otherwise
Explanatory variables	
Techsupport	1 if the respondent feels that cooperative technical professionals regularly visit the farm; 0 otherwise
Training	1 if the respondent feels that the cooperative provides technical training; 0 otherwise
Marketinfo	1 if the respondent feels that the cooperative provides up to date market information; 0 otherwise
Credit	1 if the respondent feels that the cooperative provides credit to its members; 0 otherwise
Control variables	
Age	Age of the respondent, in years
Gender	1 if female; 0 otherwise
Income	1 if income is perceived as enough to live or that allows to live comfortably; 0 otherwise
Education	1 if formal education ≥ 9 years; 0 otherwise
Livestockvar	1 if herd increased after cooperative adherence; 0 otherwise
Participation	1 if the respondent participates in cooperative meetings and decision-making; 0 otherwise

Given the binary nature of the dependent variable, the logistic model estimates the probability of perceived improvement in quality of life as a function of a linear combination of explanatory variables:

$$\Pr(Y = 1 | x) = \frac{\exp(\alpha + \beta x)}{1 + \exp(\alpha + \beta x)}$$

where exp is the base of natural logarithms, α is the constant of the equation, and β are the coefficients of the explanatory variables.

Multinomial Logit Model

To further investigate the relationship between objective improvement and subjective perception, a second model focused on perception misalignment was estimated. Respondents were categorized into three mutually exclusive groups based on the alignment between their perceived quality of life and tangible improvement, closely following the approach to categorizing perception-outcome divergence found in de Meza and Dawson^[29]: 1) Aligned, if positive/negative perception correspond with tangible gain/no gain; 2) Optimists, if participants perceive improvement despite lacking tangible gain; 3) Sceptics, if participants do not per-

ceive improvement despite having experienced tangible gain.

We used several combinations of growth in herd size (Livestockvar), income (Incomevar), and yield (Yieldvar) as proxies for tangible gains associated with cooperative membership. This multidimensional specification integrates both productive and economic aspects of cooperative performance, allowing for a more comprehensive analysis of perception misalignments and the various dimensions through which members internalize cooperative impacts.

Herd size reflects tangible gains in productive capacity and asset accumulation, both of which are widely accepted indicators of agricultural progress and food security^[30-32]. Income growth is a direct measure of economic benefits and quality of life. It has been widely used as a key proxy for livelihood improvement and household welfare in rural development studies^[33-35]. Likewise, yield represents the efficiency and productivity dimension of farming outcomes, capturing technical progress, input use, and management effectiveness. Increases in agricultural yield are consistently associated with greater food security, resource optimization, and

resilience, and are therefore an essential component of multidimensional assessments of rural progress^[32,36,37].

A multinomial logit model was employed to estimate the likelihood of a respondent belonging to one of the misaligned groups (Optimists or Sceptics) relative to the reference group (Aligned). Formally, the log odds for outcome *m* (one of the *j* misaligned groups) relative to *b* which is the base group (Aligned), is given by:

$$\ln \Omega_{m|b}(x) = \ln \frac{\Pr(y = m | x)}{\Pr(y = b | x)} = x\beta_{m|b} \quad \text{for } m = 1 \text{ to } J$$

Each *J* equation represents the log odds of being in category *m* versus the base category, conditional on the covariates X_1, X_2, \dots, X_k . The probability to belong to a specific category can then be predicted from the following expression:

$$\Pr(Y = m | x) = \frac{\exp(x\beta_{m|b})}{\sum_{j=1}^J \exp(x\beta_{j|b})}$$

The structure of the independent variables resem-

bles that of the logit model, except for Livestockvar, which was excluded as it was utilized to delineate the three categories of the dependent variable.

In their comprehensive work, Freese and Long^[38] thoroughly examine the many aspects related to the estimation, fitting, and interpretation of regression models for categorical dependent variables, including logit and multinomial logit models.

4. Results and Discussion

4.1. Descriptive Context and Perceived Benefits

To provide context for the multivariate analysis, this section highlights some descriptive insights based on **Figures 1** and **2**. These insights help illustrate producers' initial motivations for joining cooperatives and their subsequent evaluation of perceived benefits.

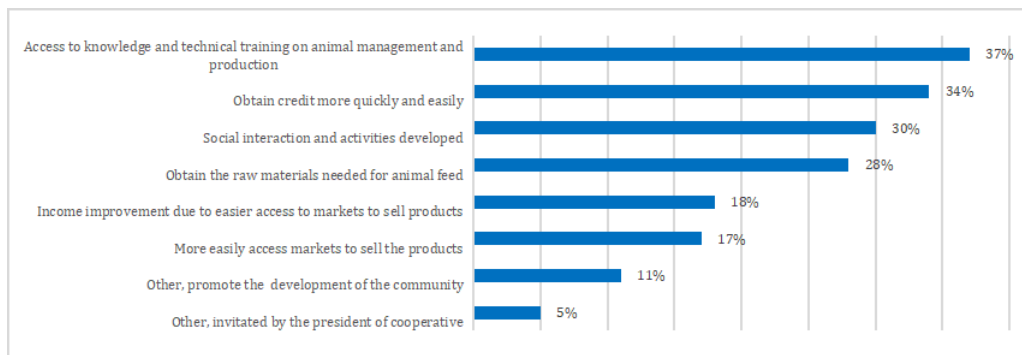


Figure 1. Reasons to join a cooperative.

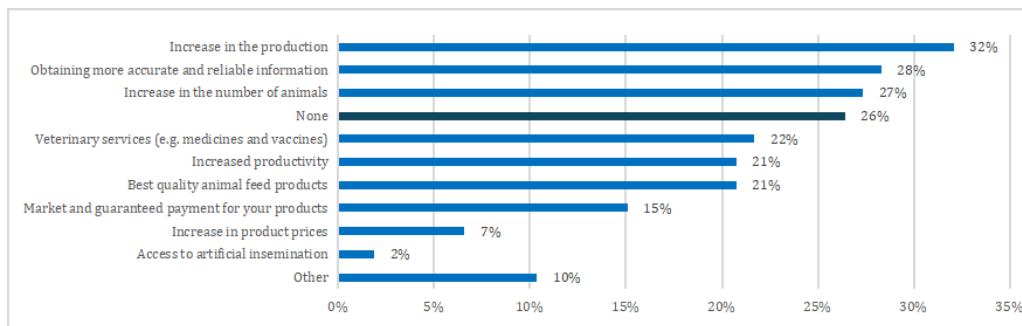


Figure 2. Perceived benefits from membership.

As illustrated in **Figure 1**, where figures are reported as a percentage of the sample, producers report joining cooperatives for a variety of practical and rela-

tional reasons. The most frequently mentioned among the three major motivations are access to technical knowledge and training, faster credit access, and op-

portunities to participate in cooperative activities. This is in line with other authors' findings, namely Nath et al.^[39] who shows that women in Bangladesh are more likely to participate in livestock farming if they are provided with additional training. Also, Hun et al.^[14], who found the poorest Cambodian households more willing to join the cooperative to receive agricultural techniques and other services. In addition, some respondents mentioned community-oriented factors like collective development goals or direct invitations from cooperative leaders. These responses show that cooperative membership is valued not only for its practical advantages, but also for its social and symbolic significance.

However, as **Figure 2** reveals, expectations are not always met. While many members identify specific benefits such as increased production or herd growth, 26% of the respondents reported that they experienced no benefits at all. This finding signals a gap between service delivery and perceived value, raising questions about the consistency and accessibility of support mechanisms across members. Such divergence is further explored in the re-

gression models that follow, which examine whether participation and service access affect perceptions of cooperative impact.

4.2. Determinants of Perceived Quality of Life

This subsection presents the findings of the logistic regression model, which estimates the impact of factors such as the cooperative's services, farmer characteristics, and engagement, on the likelihood that a producer perceives an improvement in quality of life as a result of joining a livestock cooperative. The dependent variable, Qualitylife, is binary, indicating whether the respondent perceived a positive impact (1) or not (0).

The estimation outcomes and the post-estimation goodness-of-fit tests are displayed in **Table 3**. The model demonstrates strong robustness and stability, as evidenced by consistent coefficient estimates even when specific variables or observations are excluded, and by the favourable results of the post-estimation goodness-of-fit tests.

Table 3. Estimation results.

Variables	Coef.	Std. Err.	z	P > z
Techsupport*	1.1800	0.6189	1.91	0.057
Training	0.1426	0.6415	0.22	0.824
Marketinfo*	1.1574	0.6761	1.71	0.087
Credit***	1.5173	0.5742	2.64	0.008
Age**	0.0535	0.0267	2.00	0.045
Gender	-0.6109	0.6080	-1.00	0.315
Income	0.5285	0.6078	0.87	0.385
Education***	-1.9532	0.7486	-2.61	0.009
Livestockvar**	1.4528	0.6978	2.08	0.037
Participation***	2.6749	0.9630	2.78	0.005
Constant***	-5.9902	1.8366	-3.26	0.001

LR $\chi^2 = 56.77$; Prob> $\chi^2 = 0.0000$
Pseudo R² = 0.3899
Log likelihood = -44.4078
Pearson $\chi^2 = 94.04$; Prob> $\chi^2 = 0.4502$
Correctly classified: 80.19%
Mean VIF = 1.35

***p-value < 0.01; **p-value < 0.05; *p-value < 0.1.

The results indicate that, among cooperative services, access to credit, technical support, and market information all show positive and statistically significant effects, suggesting that these services effectively contribute to members' quality of life, at least in terms of perception. Training, however, does not emerge as a significant factor, despite being frequently mentioned in the descriptive data as a motivation for joining. This may indicate a gap

between training provision and its practical impact, or potential issues related to the content or frequency of training sessions. The positive effects of technical support, credit, and market information services align with the results reported by Ahmed and Mesfin^[8], Bachke^[5], Manirakiza et al.^[7] and Molla^[40], who observed that access to such services was associated with improvements in members' livelihoods. However, the lack of a significant im-

part from training echoes concerns raised by Molla^[17], who argued that weak training quality or limited applicability often reduce the effectiveness of capacity-building programs within cooperatives. In the specific case of Northern Burundi, as noted by Manirakiza et al.^[7], the lack of trainers, the difficulty in traveling and the lack of training manuals represent some of the obstacles to producers having access to training.

Regarding producer profiles, the results show that gender and income are not statistically significant. On the other hand, older producers are more likely to report a positive perception of improved quality of life, which may be linked to the tendency of older individuals to exhibit greater cooperativeness, as noted by Cardenas and Carpenter^[3]. The same happens with farmers with lower educational attainment which resonates with Bernard et al.^[41], who suggested that more vulnerable or less connected individuals may derive greater marginal benefits from cooperative services. In contrast, producers with higher education may either have more critical standards or alternative channels of support and information, leading to more tempered perceptions. These findings, however, are not unanimous in the literature. Bolton^[6] asserts that in various East African nations, cooperative membership proved more advantageous for household heads possessing higher educational attainment. This disparity highlights a perception gap, where differences in background characteristics such as education may shape how producers interpret and report the benefits of cooperative membership.

The significant positive coefficient of the variable *Livestockvar*, suggests that farmers who have experienced an increase in the number of animals on their farm after joining the cooperative are more likely to perceive that membership improved their quality of life. As shown by Hun et al.^[14], in Cambodia, adherence to a cooperative improves yield and increases the number of animals. An increase in livestock numbers typically translates into higher income streams from the sale of livestock products and into wealth accumulation, since livestock serves as both a source of income and a form of capital. As stated by Ahmed and Mesfin^[8], enhanced economic power and stability, allow the household to increase its expenditure on both food and non-food items, such as clothing, hous-

ing, education, and medical care which may strengthen the perception of a good contribution from the cooperative in their quality of life. Besides its impact on the farmer's household economic status, an increase in the number of animals may also translate into non-economic benefits, such as empowerment, self-reliance and community recognition^[39,42], that influence the perceptions of quality of life. Farmers who expand their herds may experience increased independence and competence in managing their livelihoods, improved social status and a reinforced sense of pride and satisfaction.

Participation in cooperative meetings and decision-making is the most significant predictor of a positive perception of quality of life. Members who actively engage in cooperative decision-making are substantially more likely to report that their quality of life has improved. This finding is consistent with the idea that empowerment and a sense of ownership over outcomes are central to how cooperative benefits are perceived. These findings are consistent with previous research in sub-Saharan Africa, specifically in Tanzania^[16] which highlights the role of participation in shaping subjective quality of life among cooperative members. The author argues that producers should know the cooperative's mission and objectives and participate in their activities, as this increases commitment and future benefits. Donkor and Hejkrlik^[22] found that members more actively involved in cooperative governance reported stronger perceived benefits. Similarly, Bhuyan and Karantininis^[23] emphasized that participation reinforces satisfaction and motivates further engagement, creating a virtuous cycle. In Bangladesh, Veysset et al.^[32] found that after joining a cooperative, women livestock producers showed higher agency in decision-making, freedom of movement, asset ownership, and political and legal awareness. This illustrates the impact of participation in the empowerment of women farmers, allowing them to focus on their own opinions, needs, and demands.

However, this relationship should not be interpreted as strictly causal. Participation and perceived well-being may be jointly influenced by members' prior motivation, satisfaction, or other unobserved factors. Although several controls were included to mitigate confounding, the cross-sectional nature of the data prevents full correction

for potential endogeneity or reverse causality. The results should therefore be viewed as indicative of association rather than direct causation.

The findings indicate that cooperative benefits are not uniformly recognized by members, and that individual involvement and context influence farmers’ subjective assessments. Consequently, as emphasized by Conzen and Häberli^[21] and Luxen et al.^[20] it is imperative to incorporate additional relational and perception-based dimensions in evaluating the role of cooperatives in rural development. However, while this model explains general patterns of perceived benefit, it does not fully address a critical issue: why some producers who don’t experience objective progress, such as increased livestock, report corresponding improvements in their quality of life and vice versa. This question is explored in the next section through a focused analysis of perception divergence.

4.3. Understanding Perception Misalignments

As previously referred, to more effectively isolate the influence of perception on producers’ assessment

of cooperative outcomes, respondents were categorized into three groups based on the alignment between their perceived quality of life change and actual multidimensional progress. Four alternative models were estimated, each using a distinct indicator of objective improvement: A) simultaneous increase in herd size and income; B) simultaneous increase in herd size and yield; C) simultaneous increase in yield and income; and D) simultaneous increase in herd size, yield, and income.

For each model, producers could theoretically fall into one of the following three categories: (1) Aligned—individuals whose perception of quality-of-life change corresponds with the actual multidimensional improvement (base outcome); (2) Optimists—individuals who perceive enhancement despite no objective multidimensional gain; and (3) Sceptics—individuals who experience measurable multidimensional progress but do not report enhanced quality of life.

The key findings from the multinomial regression analyses for the four multidimensional models are summarized in **Table 4**. Full estimation results, including coefficients and statistical diagnostics, are available in the **Appendix A**.

Table 4. Perception Misalignments: A Multinomial Analysis.

Variables/Models	A	B	C	D
Group 1 - Aligned (Base outcome)	n = 55	n = 58	n = 55	n = 53
Group 2 - Optimists	n = 51	n = 47	n = 51	n = 53
Techsupport	+	+	+	+
Training	+	+	+	+
Marketinfo	+	+	+	+
Credit	+	+	+	+
Age	+	+	+	+
Gender	+	+	+	+
Income	-	-	-	-
Education	-	-	-	-
Participation	+	+	+	+
Constant	-	-	-	-
Group 3 - Sceptics	n = 0	n = 1	n = 0	n = 0

Positive, statistically significant
Positive, statistically not significant
Negative, statistically significant
Negative, statistically not significant

(***) p-value < 0.01; (**) p-value < 0.05; (*) p-value < 0.1.

The direction and significance of the main predictors, especially participation, credit access, technical support, and education, remained consistent across specifications, confirming the results’ stability and robustness. The multinomial estimations confirm that relational and enabling factors, particularly participation in cooperative

decision-making and access to credit, continue to be the strongest predictors of optimistic perceptions. However, the application of multinomial analysis refines this interpretation. While the logistic regression model linked these variables to overall perceptions of quality of life, the current findings show that they specifically explain why

some members feel better off despite no material gains. Members who are actively involved, have access to cooperative credit, and, to a lesser extent, receive technical assistance perceive progress because these elements signal trust, empowerment, and institutional backing. Education, on the other hand, although statistically significant in only one specification, contributes negatively to optimism, implying that more educated members may use stricter evaluative standards or have higher expectations, moderating their perceived sense of improvement. It is also possible that for these members, technical assistance and access to credit contribute less to their sense of empowerment and social capital, as they may already possess broader resources and information networks beyond the cooperative.

The Sceptic category is only marginally represented, indicating that instances of objective advancement without a corresponding perception of improved quality of life were very limited. This suggests that objective and perceived progress tends to converge, reducing the likelihood that producers will experience tangible gains without recognizing them. It is also plausible that individuals more sceptical of cooperative benefits are underrepresented among members, since people's predispositions toward collective action and trust vary considerably^[3]. People who do not believe in cooperation may self-select out, never participate, or leave early. Those who remain members are already inclined to favor collaboration. However, the Optimist group is clearly present, showing that some members continue to perceive progress even in the absence of measurable multidimensional improvement. This pattern reinforces the notion that optimism is rooted not only in material outcomes but also in relational and psychological dimensions of cooperative life. As emphasized by other authors^[19,21], well-being derives from the integration of material, social, and emotional factors. Thus, while approximately half of the members are aligned, positive perceptions may also emerge from symbolic and anticipatory experiences of inclusion, trust, and empowerment.

5. Conclusions

This study examined how cooperative membership in STP influences producers perceived and actual quality

of life, emphasizing the interaction between subjective perceptions and multidimensional objective outcomes. The results demonstrate that cooperative participation generates complex effects that extend beyond material improvement. Members' perceptions of enhanced quality of life are closely tied to relational and enabling factors, notably participation in decision-making, access to credit, and technical support, which foster empowerment, trust, and social inclusion.

The multinomial analysis reveals that the Sceptic group—those who experience improvement but do not perceive enhanced quality of life—is only marginally represented. This finding suggests that when progress occurs across multiple livelihood dimensions (income, yield, and herd size) tangible and perceived quality of life tend to align. However, the high representativeness of Optimists—members who perceive improvement despite no objective gain—strengthens the idea that subjective welfare is not solely the reflection of tangible achievements. Members lived experiences, their participation in collective decision-making, and their perception of institutional support are as central as objective performance indicators to understanding how cooperatives contribute to perceived rural quality of life.

Due to study limitations, the results must be approached with caution. The overall sample size is relatively small ($N = 106$), which constrains the statistical power of the analysis and limits the complexity of estimable models, and the data relies on self-reported metrics, encompassing livestock increase and perceived quality of life, which may be influenced by recall bias or social desirability effects. Furthermore, the study is context-specific, concentrating on cooperatives in STP; the findings may not be directly applicable to other regions with varying institutional and cultural contexts. Future research should seek to corroborate and enhance these findings by employing larger and more representative samples, incorporating complementary qualitative methodologies, and accounting for more objective assessments of both progress and perception. Longitudinal studies would be especially beneficial for analyzing the evolution of perceptions over time in relation to cooperative engagement and shifting conditions.

Some policy and practical implications can be

drawn from the findings. Cooperative development strategies should prioritize inclusive governance and participatory mechanisms that can enhance members' sense of empowerment and ownership. Second, given the psychological benefits of financial inclusion, credit programs should be designed not only to increase output but also to improve members' sense of safety and community. Third, technical assistance needs to adopt locally specific, participatory methods rather than sporadic interventions to boost producers' self-esteem and capacity for innovation. Fourth, policymakers and cooperative managers should incorporate indicators at the cooperative evaluation framework level that capture both material outcomes (like income, productivity, and assets) and subjective dimensions (like satisfaction, trust, and inclusion) to more accurately assess the transformative potential of cooperatives.

In conclusion, the persistence of optimistic perceptions, even in the absence of measurable gains, serves as a reminder that positive expectations, and social recognition are both development resources. Building environments where members feel valued, empowered, and supported is crucial for the long-term sustainability and cohesion of cooperative institutions in smallholder economies.

Author Contributions

Conceptualization, D.L.; literature review, D.L., I.D. and P.S.; methodology, D.L., I.D. and P.S.; data collection, D.L.; formal analysis, I.D. and P.S.; writing and revision, D.L., I.D. and P.S. All authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement

All procedures performed in this study involving human participants were conducted in accordance with the ethical standards outlined in the Declaration of Helsinki (1964) and its subsequent amendments. All the participants were verbally informed of the study's objectives, the voluntary nature of their participation, the method of data collection, and the confidentiality of their responses prior to data collection. Respondents were reminded that there were no right or wrong answers and that they could stop responding to the survey at any time. Informed consent was obtained orally. The study was not submitted for approval by the institution's Ethics Committee because no sensitive or personally identifiable data would be collected. All data were anonymized and aggregated in a way that prevents the identification of individual participants.

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Data Availability Statement

The datasets generated and analyzed during the current study are not publicly available because participants' privacy could be compromised but are available from the corresponding author on reasonable request.

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Conflicts of Interest

The authors declare no conflict of interest.

Appendix A

Table A1. Model A Estimation.

Variables	Coef.	Std. Err.	z	P > z
Group 1 - Aligned (n = 55) (base outcome)				
Group 2 - Optimists (n = 51)				
Techsupport	0.6768	0.5195	1.30	0.193
Training	0.0582	0.5817	0.10	0.920
Marketinfo	0.5959	0.5948	1.00	0.316
Credit	1.5522	0.5537	2.80	0.005
Age	0.0325	0.0230	1.41	0.157
Gender	0.5171	0.5174	1.00	0.318
Income	-0.1980	0.5247	-0.38	0.706
Education	-0.7542	0.5852	-1.29	0.197
Participation	2.0897	0.9292	2.25	0.025
Constant	-4.8192	1.6344	-2.95	0.003
Group 3 - Sceptics (n = 0)				
LR $\chi^2 = 39.86$; Prob > $\chi^2 = 0.0000$				
Pseudo R ² = 0.2715				
Log likelihood = -53.4699				

Table A2. Model B Estimation.

Variables	Coef.	Std. Err.	z	P > z
Group 1 - Aligned (n = 58) (base outcome)				
Group 2 - Optimists (n = 47)				
Techsupport	0.9914	0.5230	1.90	0.058
Training	0.2949	0.5825	0.51	0.613
Marketinfo	0.0866	0.6037	0.14	0.886
Credit	1.2924	0.5709	2.26	0.024
Age	0.0202	0.0225	0.90	0.370
Gender	0.0059	0.5162	0.01	0.991
Income	0.3284	0.5238	0.63	0.531
Education	-1.2617	0.5832	-2.16	0.030
Participation	2.3505	0.9508	2.47	0.013
Constant	-4.3446	1.6040	-2.71	0.007
Group 3 - Sceptics (n = 1)				
LR $\chi^2 = 50.59$; Prob > $\chi^2 = 0.0001$				
Pseudo R ² = 0.3249				
Log likelihood = -52.5668				

Table A3. Model C Estimation.

Variables	Coef.	Std. Err.	z	P > z
Group 1 - Aligned (n = 55) (base outcome)				
Group 2 - Optimists (n = 51)				
Techsupport	0.3930	0.5110	0.77	0.442
Training	0.1774	0.5796	0.31	0.759
Marketinfo	0.7793	0.5965	1.31	0.191
Credit	1.5123	0.5456	2.77	0.006
Age	0.0350	0.0227	1.54	0.124
Gender	0.5098	0.5136	0.99	0.321
Income	-0.2877	0.5228	-0.55	0.582
Education	-0.9002	0.5815	-1.55	0.122
Participation	1.3815	0.8092	1.71	0.088
Constant	-4.1859	1.5411	-2.72	0.007
Group 3 - Sceptics (n = 0)				
LR $\chi^2 = 37.96$; Prob > $\chi^2 = 0.0000$				
Pseudo R ² = 0.2586				
Log likelihood = -54.4184				

Table A4. Model D Estimation.

Variables	Coef.	Std. Err.	z	P > z
Group 1 – Aligned (n = 53) (base outcome)				
Group 2 – Optimists (n = 53)				
Techsupport	0.4610	0.5125	0.90	0.368
Training	0.1840	0.5753	0.32	0.749
Marketinfo	0.7245	0.5893	1.23	0.219
Credit	1.4189	0.5347	2.65	0.008
Age	0.0405	0.0229	1.77	0.076
Gender	0.3359	0.5194	0.65	0.518
Income	-0.1115	0.5190	-0.21	0.830
Education	-0.8655	0.5815	-1.49	0.137
Participation	1.5989	0.8083	1.98	0.048
Constant	-4.5012	1.5537	-2.90	0.004
Group 3 – Sceptics (n = 0)				
LR $\chi^2 = 37.71$; Prob > $\chi^2 = 0.0000$				
Pseudo R ² = 0.2567				
Log likelihood = -54.6164				

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