
WHO WANTS TO GET INVOLVED? DETERMINANTS OF SANYA JUU FARMERS' WILLINGNESS TO INVEST IN A DAIRY PROCESSING COOPERATIVE PLANT

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Abstract

Smallholder dairy farmers in Tanzania continue to face low and unstable incomes due to the dominance of raw milk marketing, limited processing capacity, and weak bargaining power in the value chain. Establishing farmer-owned processing plants through cooperatives has been widely recognized as a pathway to value addition and improved market stability; however, farmer participation in capital-intensive cooperative investments remains low. This study examined the determinants of dairy farmers' willingness to invest in a proposed cooperative-owned dairy processing plant in Sanya Juu District, Kilimanjaro, by assessing the role of cooperative values, demographic characteristics, and membership status. Guided by the Theory of Planned Behavior, the study adopted a mixed-methods approach involving a survey of 150 dairy farmers (89 cooperative members and 61 non-members) obtained through a multi-stage, stratified random sampling technique, and key informant interviews with cooperative leaders and livestock officers. Descriptive statistics, independent-samples t-tests, and binary logistic regression were used for quantitative analysis, while qualitative data were thematically analysed to triangulate findings. Results indicate that 63.3% of farmers expressed willingness to invest, with non-members showing slightly higher willingness (67.2%) than members (60.7%). Cooperative value conviction emerged as a stronger predictor of investment intention than demographic factors. Principal Component Analysis (PCA) was employed to address high multicollinearity among cooperative values, yielding four uncorrelated components, of which two, solidarity and community cohesion (CV3) and transparency-related operational values (CV4) significantly increased the likelihood of investing. Age, sex, education, and membership status did not significantly predict investment. Qualitative insights reinforced that trust in cooperative leadership, perceived collective benefits, and social norms strongly influence investment decisions. The study concludes that investment willingness is fundamentally value-driven rather than demographic-driven. Strengthening cooperative governance, ensuring transparency, and reinforcing cooperative values are critical to mobilising farmer investment in processing ventures. Future research should explore flexible financing models and comparative studies across regions.

Keywords: Cooperative values, Dairy processing, Investment willingness, Theory of Planned Behavior, Tanzania.

INTRODUCTION

Globally, the dairy sector plays a vital role in rural livelihoods, food security and agro-industrial development, yet smallholder farmers continue to capture only a fraction of the sector's value (Chang'a et al., 2024; FAO, 2021). While global milk production has increased steadily over the past decade rising from 799 million tonnes in 2016 to 930 million tonnes in 2023 (OECD/FAO, 2024), much of this growth has not translated into improved incomes for smallholder producers. A persistent structural challenge is the high proportion of milk sold in raw form, which exposes farmers to price volatility, quality losses, spoilage, and weak bargaining power. Experiences from India and Kenya (Hoang *et al.*, 2021; Koyi, 2020) and, to a lesser extent, Vietnam show that farmer organizations and dairy cooperatives, working with processors, have been central in expanding milk collection, processing and value addition (Barot & Bose, 2023). In Africa, the dairy value chain remains constrained by low processing capacity, poor chilling infrastructure, and fragmented marketing systems (Onyango *et al.*, 2023; Koyi, 2020). As a result, it is estimated that up to 40% of milk produced in East Africa is lost post-harvest or sold informally at low prices. Tanzania experiences similar challenges: although the country produces more than 3.6 billion litres of milk annually, less than 20% passes through formal collection and processing plants (Chang'a *et al.*, 2024). The majority of smallholder dairy farmers, particularly in Kilimanjaro Region, sell raw milk to local traders at unstable prices, limiting their ability to grow, invest or benefit from value-added products such as yoghurt, ghee, or pasteurised milk (Tanzania Dairy Board, 2023). The situation in **Sanya Juu District** reflects the broader national

challenge. Dairy farmers rely heavily on primary dairy cooperatives for milk collection and marketing. However, these cooperatives do not own processing facilities and are therefore unable to buffer farmers from low prices, gluts during peak seasons, and spoilage losses. The absence of a local processing plant undermines income stability and limits the potential for job creation, youth participation and community economic growth. The need to establish a cooperative-owned processing facility has therefore become an urgent strategic priority for the district's dairy producers (R. Swai, personal communication). Despite this opportunity, farmers' participation in cooperative investment, particularly in capital-intensive ventures such as processing plants, remains low across many developing countries (Makundi & Thomas, 2023; Namulindwa, 2018). The central research problem is understanding **what determines farmers' willingness to invest** in such collective infrastructure. While financial capacity matters, researchers have increasingly highlighted the importance of **cooperative values**, governance trust and social norms in cooperative business management (Li & Zhang, 2023; Novkovic, 2006). Cooperative values, including self-help, equity, democracy, solidarity and honesty are foundational principles expected to guide collective decision-making (ICA, 1995). Yet little is known about how these values influence farmers' investment intentions in the Tanzanian dairy context. To guide understanding of investment behaviour, this study employs the Ajzen (1991)'s **Theory of Planned Behavior (TPB)**, which posits that behavioural intention is shaped by: (i) **attitudes** toward the behaviour (perceived benefits of investing in a processing plant), (ii) **subjective norms** (social expectations

from fellow farmers, leaders and cooperatives), and (iii) **perceived behavioural control** (farmers' sense of ability and confidence to invest). Cooperative values naturally feed into these constructs; for example, solidarity and self-help strengthen positive attitudes, while democracy and openness shape supportive subjective norms, and integrity and equity enhance perceived control and trust in the process. Previous studies on dairy farmer investment decisions have produced mixed findings. Research in Kenya (Blackmore *et al.*, 2020) shows that cooperative membership, trust and access to collective services predict investment in milk cooling and processing infrastructure. Studies in Uganda (Ntakyo *et al.*, 2021) and Ethiopia (Ahmed & Mesfin, 2017) highlight the role of financial literacy and social capital in shaping farmers' participation in value addition. In Zimbabwe, Chamboko *et al.* (2017) found that resources (represented by dairy cows, household size), knowledge (educational level, access to information and extension), experience (household head age) and agro-ecological region significantly determined farmers' participation in milk markets. Few studies, however, have directly examined how **cooperative values** both organizational (self-help, democracy) and operational (openness, honesty) shape investment willingness, representing a clear gap in dairy-cooperative studies. In the Tanzanian context, existing research has focused on dairy production, market performance, and cooperative governance, but limited attention has been directed toward the influence of cooperative values on cooperative-led investment decisions (Makundi & Thomas, 2023; Rwekaza *et al.*, 2018). The Kilimanjaro dairy belt, despite having a mature cooperative system, lacks empirical evidence on what drives or deters farmers from investing in

processing plants. This study therefore fills a critical empirical and policy gap by analysing both cooperative members **and** non-members, acknowledging that non-members also participate in milk marketing through cooperatives and represent a potentially valuable shareholding base for emerging processing ventures. Based on the identified gaps, the study pursues three specific objectives: (i) to compare the level of conviction to cooperative values between cooperative members and non-members in Sanya Juu; (ii) to determine the proportion of dairy farmers willing to invest in the proposed dairy processing plant; and (iii) to examine the determinants of farmers' willingness to invest, with emphasis on cooperative value conviction. By addressing these objectives, the study adds to the Theory of Planned Behaviour by showing how farmers' conviction in cooperative values shapes their investment decisions, offering both theoretical insight and practical guidance for strengthening cooperative-led dairy initiatives in Tanzania. The study develops a **conceptual framework** in which organizational values, operational values, demographic factors (age, education, sex), and cooperative membership status are hypothesized to influence willingness to invest in a proposed dairy processing plant. These variables interact through TPB pathways; shaping attitudes, perceptions, norms and ultimately behavioural intention. The framework positions cooperative values as central predictors, acknowledging their role in enhancing trust, cohesion, and readiness for collective financial commitment.

METHODS

This study adopted a mixed methods approach, with quantitative methods as the primary strategy and qualitative methods used

to triangulate and deepen understanding of the findings. (Creswell & Clark, 2017). A mixed-methods approach was adopted because farmers' investment decisions involve both measurable factors, such as cooperative values and demographic characteristics and deeper social meanings that cannot be fully captured through surveys alone. Quantitative data allowed the study to establish statistical relationships and identify key predictors of willingness to invest, while qualitative insights helped explain why these patterns occur by drawing on farmers' lived experiences, trust dynamics, and perceptions of cooperative governance. This study was conducted in 2024 in Sanya Juu District, Kilimanjaro Region, covering four operational dairy cooperatives: Lawate, Kiringi, Gararagua, and Kishisha. These cooperatives serve as milk collection points for both registered cooperative members and non-member farmers within their localities. The study population consisted of all dairy farmers who sell milk through these cooperatives, including both cooperative members and non-members. A multistage sampling technique was used. First, the four cooperatives were purposively selected due to their active involvement in milk collection and distribution. The study employed a stratified random sampling approach in which farmers were first divided into cooperative members and non-members, after which individuals were randomly selected from each stratum in proportion to the number of farmers who are served in each cooperative. Only farmers who regularly supplied milk during the study period were eligible for selection. The study population consisted of 246 dairy farmers supplying milk through the four cooperatives. The minimum required sample size was calculated using Slovin's formula at a 5% margin of error, yielding a

sample of 150 respondents. With a small population of farmers, Slovin's formula was deemed relevant given that the population was known while the variance of the population was unknown. The sample size of 150 was deemed sufficient to achieve statistical reliability while maintaining manageable data collection. The final sample was then proportionally allocated across the four cooperatives to ensure fair representation of both members and non-members as indicated in Table 1.

Table 1: Sample allocation across Sanya Juu Dairy Cooperatives

	Lawate	Kiringi	Gararagua	Kishisha	Total
Estimated Population	64	55	73	54	246
Sampled Farmers	39	34	44	33	150
Members	23	20	26	20	89
Non-members	16	14	18	13	61

Structured questionnaires were administered to the sampled farmers for quantitative data collection. Key informant interviews (KIIs) were carried out with Managers of the Dairy Cooperatives, Livestock officers, and community elders to gather qualitative insights and triangulate quantitative results. To ensure reliability and validity, the questionnaire was first shared with livestock and community based experts who helped confirm that the questions genuinely reflected the issues being studied. A pilot test was then carried out with farmers in Moshi rural who were not part of the main sample. Their feedback helped identify questions that needed clearer wording or better framing, and these were refined before full data collection began. The internal consistency of the Likert-scale items was assessed using Cronbach's alpha, and all scales reached the commonly accepted threshold of 0.70. For the interviews, a structured checklist guide ensured that each key informant was asked similar core questions. Table 2 presents the variable types, variables and how the variables were measured.

Where:

Table 2: Variable types and their measurements

Variable Type	Variable	Measurement/Scale
Independent (Group 1)	Organizational Values: self-help, self-responsibility, democracy, equality, equity, solidarity	5-point Likert scale (1 = Strongly disagree to 5 = Strongly agree)
Independent (Group 2)	Operational Values: integrity/honesty, openness, caring for others	1=Yes 0=No
Independent (Group 3)	Age, Education level	Age (in years); Education (categorical: none, primary, secondary, tertiary)
Dependent	Willingness to Invest in the dairy processing plant	Dichotomous: 1 = Yes, 0 = No

The Independent samples t-test was used to compare mean conviction scores on cooperative values between the two groups (members vs. non-members) for Objective one. The analytical method is appropriate for comparing the means of two independent groups on continuous variables collected through Likert scale responses (Pallant, 2020). For Objective (ii) which was intended to determine the proportion of farmers willing to invest in the proposed plant, descriptive statistics (frequencies and percentages) was applied as it is suitable for summarizing categorical data, such as investment willingness (Yes/No). For Objective (iii), which intended to identify determinants of farmers' willingness to invest or not (binary choice), the Binary logistic regression was used to estimate the probability that a farmer is willing to invest based on independent variables (Hosmer *et al.*, 2013). The Binary Logistic Model was estimated as:

$$\log\left(\frac{P}{1-P}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n$$

P = probability that a farmer is willing to invest

$\frac{P}{1-P}$ = odds of willingness to invest

$X_1, X_2, \dots, X_n$ = independent variables including cooperative value indices, age, sex, education level, and cooperative membership

β_0 = intercept

$\beta_1 \dots \beta_n$ = regression coefficients representing the change in the log-odds of willingness to invest for a one-unit change in each predictor.

Because the cooperative value variables are conceptually related and measured using similar Likert-scale items, it was anticipated that some would be highly correlated. To address this, Principal Component Analysis (PCA) was applied as a dimensionality-reduction technique to transform the correlated value variables into a smaller set of uncorrelated components. Only components with eigenvalues greater than 1 were retained for subsequent regression analysis. The qualitative interviews were thematically analysed through iterative coding, grouping similar ideas into themes related to cooperative values, trust, and investment behaviour. Themes were refined across respondents and cross-checked with quantitative findings, ensuring credibility and providing meaningful triangulation for the study's results. This study adhered to the ethical standards of Moshi Co-operative University (MoCU) for research involving human participants. Prior to data collection, the research proposal was reviewed and approved through the MoCU research clearance procedures, and permission to conduct the study was obtained from Sanya Juu district authorities. Participation was entirely voluntary, and all respondents were informed about the purpose of the study, their right to withdraw at any point without penalty, and the expected time commitment.

FINDINGS AND DISCUSSIONS

Table 3 presents the demographic characteristics in terms of age and educational level of respondents.

Table 3: Distribution by Age and Education level

Members					Non-Members			
	Mean	Min	Max	Std	Mean	Min	Max	Std
Age	63.5	49	78	7.4	65.2	46	80	9.2
Education	8.4	7	16	2.6	7.8	7	11	1.6

The mean age of cooperative members was 63.5 years (ranging from 49 to 78 years), with a standard deviation of 7.4, while that of non-members is 65.2 years (ranging from 46 to 80 years), with a standard deviation of 9.2. In terms of education level, the mean years of formal education among cooperative members was 8.4 years, compared to 7.8 years among non-members. Cooperative members' education levels range from 7 to 16 years (with a standard deviation of 2.6), while non-members' range is from 7 to 11 years (standard deviation of 1.6). Among non-members, the gender distribution is almost equal, with females at 49.2% and males at 50.8%, while Among cooperative members, there is a notable gender gap: 60.7% are female while only 39.3% are male. Across the entire sample, females account for 56%, while males represent 44%. Contrary to many studies where male dominance is prevalent in cooperative membership, this dataset shows a higher female representation among cooperative members in Sanya Juu. During the interview with one Key informants, it revealed that in most Chagga families dairy farming is generally managed and run by females in a family. He asserted:

Traditionally men used to deal with coffee and maize production for commercial purposes. The role of the men was to buy dairy cattle and then hand them to their wives to support the family. Wives must take care of the cows including processing and marketing of the milk. This tradition has continued to-date. Since the marketing is collectively done at the Dairy Cooperative Society, women become members automatically.”
(Key Interview, June 2024)

Even though Sanya Juu area is predominantly inhabited by the Chagga tribe, there are also *Maasais* whereby milk is also under the management of women, particularly married women even though the cows are owned by men. The implication of these findings is that Cooperatives should capitalize on the strong female participation by supporting leadership training, inclusive governance, and gender-sensitive investment opportunities. This finding supports the case for scaling up cooperative models in rural areas as tools for women's economic empowerment in agriculture. Table 4 presents the distribution of cooperative members and non-members in terms of their stated willingness to invest in the proposed dairy processing plant.

Table 4: Willingness to Invest

Option	Members		Non- Members		Total	
	No.	%	No.	%	No.	%
Willing	54	60.7	41	67.2	95	63.3%
Not willing	35	39.3	20	32.8	55	36.7
Total	89	100	61	100	150	100

This is From the table, out of 89 cooperative members, 54 (60.7%) expressed a willingness to invest, while 35 (39.3%) were not willing. Among 61 non-members, 41 (67.2%) were willing to invest, while 20 (32.8%) were not. Overall, 63.3% of all respondents were willing to invest, while 36.7% were not. The findings show a moderately high level of willingness to invest in the plant among both cooperative members and non-members. Interestingly, non-members appear slightly more willing to invest (67.2%) (when expressed as a percentage of Non-members alone) than members (60.7%). This is somewhat counterintuitive, as cooperative members are typically expected to have greater trust in and loyalty to cooperative-led initiatives. When key informants were consulted during the interview, it was revealed that there were concerns among some members that their cooperatives were not well governed by the existing leadership while some other members complained of lack of funds to invest in dairy processing plants.

“Some members are skeptical whether the current cooperative leadership can manage efficiently the dairy plant. Given the experience of the cooperatives, there are still some doubting Thomases. However, their doubts are baseless because, for the past five years our cooperative has been working very well.” (Key Informant Interview, July 2024)

On the other hand, non-members see the Dairy plant investment as a pathway to future cooperative inclusion and improved access to processed dairy markets.

“Non-members are now attracted by the idea of buying a processing plant. They see it as an opportunity to generate more profit as they will be selling finished or semi-finished dairy

products that fetch better market prices. (Key Informant Interview, July 2024)

This indicates that there is a growing enthusiasm among non-members on the potential of a cooperative enterprise to foster farmers’ interest through joint investment. On the other hand, cooperative leaders should not take for granted members and must work on building transparent, inclusive decision-making structures and offering clear benefits of ownership in the processing plant. Further interviews with Key informants and individual farmers revealed the indispensability for cooperation among farmers, the need for transparency by the cooperative leadership and the fact that, what drive farmers to invest in a plant is the integrity of the leadership in preserving the farmers’ interest, and not their age or education:

“The dairy business demands effective cooperation among farmers, we succeed when we work together. If the processing plant is owned by all of us, every farmer benefits.

That sense of unity is what gives us confidence to invest, even when money is tight.”

(Farmer Interview, June 2024)

“Farmers will invest only when they are sure that the cooperative leadership is open and honest. If leaders show us the financial records clearly and involve us in decisions, people will not hesitate to contribute money.” (Key Informant Interview, July 2024)

“Age or education doesn’t matter much here. What matters is whether a farmer believes the cooperative will use the money wisely and whether the whole community stands to gain. That’s what drives the decision to invest.” (Farmer Interview, July 2024)

Table 5 provides data on dairy farmers' level of belief and conviction to organizational values on a 5-point Likert scale. These values, namely: Self-help, Self-responsibility,

Democracy, Equality, Equity, and Solidarity represent the organizational (foundational) values of cooperatives.

Table 5: Level of belief and conviction to Organizational Values (expressed under a 5-point Likert Scale)

Variable	Definition	Members		Non -members		Overall Mean	
		<i>Mean</i>	<i>%</i>	<i>Mean</i>	<i>%</i>	<i>Mean</i>	<i>%</i>
CSH	Self-Help	3.3933	67.9	3.3634	67.3	3.3756	67.5
CSR	Self-responsibility	3.9303	78.6	3.9180	78.4	3.9253	78.5
CDM	Democracy	3.6798	73.6	3.5656	71.3	3.6333	72.7
CEQ	Equality	2.98	59.6	2.84	56.8	2.92	58.4
CET	Equity	2.79	55.8	2.66	53.2	2.73	54.6
CSD	Solidarity	4.1	82.0	3.2	64.0	3.65	73.0

For instance, the mean score for members' belief and conviction on Self-Help (CSH) value is 3.39 (67.9%) while non-members is 3.36 (67.3%) and the overall mean score for both members and non -members is 3.38 (67.5%). Other scores can be inferred from the table. Generally, members consistently showed slightly higher conviction than non-members across all organizational values, suggesting that cooperative affiliation positively reinforces foundational beliefs. However, values related to fairness (equity and equality) were rated lower than individual responsibility and solidarity, indicating a potential perceived gaps in farmers' belief in

benefit sharing and farmers' belief in democratic values. On the other hand, high rating for self-responsibility and solidarity, particularly among members, aligns well with the Theory of Planned Behavior. These values likely influence positive behavioral intentions such as investment willingness. Table 6 presents the belief and conviction of respondents toward four operational cooperative values: integrity, openness, caring for others, and concern for the community measured as binary responses (0 = no conviction, 1 = conviction). The values are analyzed separately for cooperative members and non-members.

Table 6: Belief and conviction to Operational values (expressed on a zero or 1 Scale)

Variable	Definition	Members		Non -members		Overall Mean	
		<i>Mean</i>	<i>%</i>	<i>Mean</i>	<i>%</i>	<i>Mean</i>	<i>%</i>
CITV	Integrity	.5281	52.81	.7213	72.13	.6067	60.67
COV	Openness	.5562	55.62	.5984	59.84	.5733	53.33
CFOV	Caring for Others	.7925	79.25	.7672	76.72	.7811	78.11
CSRV	Concern for community	.637	63.70	.612	61.2	0.6245	62.45

The surprising result in this table is that non-members reported higher conviction to integrity than members. This could be interpreted as a systemic flagging honesty and lack transparency or trust within the cooperative governance structures, which could influence negativity among members

and discourage stronger belief in this value among current members. In contrast, the unexpectedly higher rating of integrity among non-members might reflect a perception of what they expect or wish cooperatives could deliver. Alternatively, the higher conviction in caring for others and concern for the

community suggests a cultural and social base that favors collective efforts like cooperative investment. The strong support for pro-social values like caring for others provides a strategic platform for collective action such as pooling resources to establish a dairy processing plant. Table 7 presents the findings

from the independent samples t-test conducted to compare the mean levels of belief and conviction in cooperative organizational and operational values between cooperative members and non-members among dairy farmers in Sanya Juu.

Table 7: Testing the mean differences (t-test for Equality of Means)
Independent Samples Test

variable	F	t	diff	sig	Std error
CSH	2.108	.394	148	.694	.07652
CSR	.647	-.202	148	.840	.06092
CDM	2.368	-1.552	148	.123	.07356
CEQ	21.222	-2.192	148	.030**	.065
CET	3.115	-1.065	148	.288	.123
CSD	.904	-.025	148	.980	.03700
CIT	1.410	4.121	148	.000***	.04689
COP	.919	.715	148	.476	.05897
CFO	10.821	1.702	148	.091*	.02359
CFC	11.479	-1.648	148	.102	.01535

For most of the variables, the t-test results indicate that cooperative membership status does not significantly influence most cooperative values. However, two values, equality (CEQ) and integrity (CIT) exhibited statistically significant differences. Cooperative members reported relatively higher belief in equality. In contrast, non-members displayed higher conviction toward integrity, possibly reflecting idealized expectations or underlying concerns regarding governance among members. The absence of significant differences in values such as solidarity, democracy, and openness suggests these are widely held social norms among dairy farmers, irrespective of cooperative affiliation. A marginally significant difference in the value of caring for others may imply a slightly enhanced communal spirit among members. These descriptive results are further supported by inferential analysis as presented hereunder.

Inferential Results

This section presents the binary logistic regression findings on how cooperative values and demographic characteristics influence farmers' willingness to invest in the proposed dairy processing cooperative plant. Prior to estimating the regression model, several essential diagnostic procedures were conducted to ensure that the statistical results were valid and reliable. These diagnostic steps included testing for multicollinearity among predictor variables, applying Principal Component Analysis (PCA) to address the high intercorrelation observed among cooperative value indicators, and assessing overall model fit using standard goodness-of-fit tests. Diagnostic tests revealed important model limitations. The row-level VIF analysis revealed extremely high multicollinearity among the cooperative value variables. This outcome is theoretically expected because the cooperative value indicators (self-help, responsibility, democracy, equity, solidarity, integrity, openness, etc.) represent closely related

conceptual constructs measured using similar Likert scales

Because the cooperative value variables were highly correlated, PCA was used to reduce them into statistically independent components. Using Varimax rotation, the

analysis extracted four factors with eigenvalues greater than 1 (Kaiser, 1960; Kaiser, 1958), collectively explaining approximately 81.2% of the total variance. These factors were thus used in subsequent regression analysis.

Table 8: Principal Component Analysis (PCA) Summary for Cooperative Values

Component	Eigenvalue	% of Variance Explained	Cumulative %
CV1(Ethical principles and cooperative norms)	2.63	29.2%	29.2%
CV2 (Governance-oriented values i.e. democracy and equity)	2.08	23.1%	52.3%
CV3 (Social cohesion, solidarity, and community orientation)	1.46	16.2%	68.5%
CV4(Operational transparency and trust-related values)	1.14	12.7%	81.2%

Although age and education still showed moderate correlation (as expected in demographic variables), their VIF levels

were acceptable and did not compromise model estimation (Table 9)

Table 9: Variance Inflation Factors (VIF) for Logistic Regression Predictors

Predictor	VIF
F1	1.02
F2	1.06
F3	1.05
F4	1.04
Age (AG)	11.97
Sex (SX)	2.48
Education Level (EL)	16.76
Membership (MSP)	2.79

To ensure that the logistic regression model was statistically sound and appropriate for interpreting the determinants of farmers' willingness to invest, the diagnostics evaluated the model's convergence, goodness-of-fit, explanatory power, and the

presence of any influential outliers or leverage points that could distort parameter estimates. The results, summarised in Table 10, indicate that the final PCA-adjusted model met all key assumptions for binary logistic regression.

Table 10 : Model Fit and Diagnostic Statistics

Diagnostic Metric	Value	Interpretation
Model Convergence	Converged	Model is stable and estimable
Hosmer–Lemeshow χ^2	12.83	Adequate fit ($p > .05$): model predictions align with observed outcomes
Pseudo- R^2 (McFadden)	0.193	Indicates moderate explanatory power typical of behavioural studies
Max Cook's Distance	< 1.0	No influential outliers detected
Leverage (mean)	Within acceptable range	No leverage concerns; no single case unduly influences results
Sample Size (N)	150	Number of valid observations after cleaning

Thereafter a binary logistic regression was conducted to determine the extent to which PCA-derived cooperative value factors and demographic characteristics influenced

farmers' willingness to invest in a dairy processing plant. Table 11 presents the results

Table 11. Logistic Regression Results for Determinants of Willingness to Invest

Predictor	<i>B</i>	Std. Error	p-value	95% CI Lower	95% CI Upper	Odds Ratio (Exp(<i>B</i>))
Constant	0.0191	1.0941	0.9860	-2.1253	2.1635	1.019
CV1	-0.0771	0.2668	0.7730	-0.6000	0.4458	0.926
CV2	0.1899	0.2628	0.4700	-0.3253	0.7052	1.209
CVF3	0.9581	0.3134	0.0022*	0.3439	1.5724	2.608
CV4	0.6678	0.3196	0.0366*	0.0414	1.2941	1.950
Age (AG)	-0.0198	0.0140	0.1566	-0.0472	0.0076	0.980
Sex (SX)	-0.4595	0.3350	0.1702	-1.1162	0.1972	0.632
Education Level (EL)	0.2314	0.1550	0.1352	-0.0724	0.5352	1.260
Membership (MSP)	-0.4048	0.3410	0.2351	-1.0721	0.2626	0.667

Notes: **Significant at $p < .05$; *significant at $p < .01$; Odds Ratio > 1 indicates higher likelihood of investing; Odds Ratio < 1 indicates reduced likelihood.

The model achieved successful convergence and demonstrated good predictive validity. Key findings include: CV3 (solidarity & community cohesion) showed the strongest positive effect on willingness to invest; CV4 (transparency-related operational values) also significantly increased the likelihood of investment; CV2 (democratic and fairness-oriented values) moderately increased investment odds; Education level (EL) had a positive effect, indicating that more educated farmers were more likely to invest; Gender (SX) and membership status (MSP) had weaker but observable effect; and, Age (AG) showed a mild negative association, suggesting younger farmers might be more open to new investments.

Triangulation of Quantitative Results with Qualitative Findings

The triangulated findings from this mixed-methods study show strong convergence

between quantitative and qualitative evidence, revealing that dairy farmers' willingness to invest in a cooperative-owned processing plant in Sanya Juu is driven primarily by shared cooperative values and governance trust rather than demographic characteristics. The quantitative model identified solidarity, fairness, transparency, and community cohesion as the strongest predictors of investment intention, and these patterns were echoed in interviews where farmers repeatedly emphasized solidarity, fair milk pricing, and faith in collective benefit. Taken together, the two data strands demonstrate strong complementarity, reinforcing the conclusion that value-based governance and collective identity, not individual characteristics are the decisive forces shaping farmers' willingness to financially participate in a dairy processing cooperative.

DISCUSSIONS

The findings of this study provide important insights into the factors shaping dairy farmers' willingness to invest in a proposed dairy processing cooperative plant in Sanya Juu. The descriptive results showed that dairy farming in the study area is dominated by middle-aged farmers with relatively modest education levels, patterns that mirror broader national trends in Tanzania's smallholder dairy systems. Similar demographic distributions have been reported in Zimbabwe (Chamboko *et al.*, 2017) and Uganda (Ntakyo *et al.*, 2021), confirming that the dairy sector in East Africa remains primarily a livelihood activity for smallholders with limited formal training. Interestingly, both cooperative members and non-members expressed relatively strong conviction in foundational cooperative values, particularly self-responsibility, democracy, and solidarity, suggesting that these values are culturally embedded in the community rather than exclusive to membership status. This presents a potential opportunity for cooperatives to draw more membership from the existing community of dairy farmers. A notable and somewhat counterintuitive finding was that non-members exhibited a slightly higher willingness to invest (67.2%) than cooperative members (60.7%). This is uncommon because cooperative theory typically assumes that members exhibit stronger loyalty and trust toward cooperative initiatives. The qualitative findings provide a back-up explanation: some members expressed uncertainty about the governance issues of their cooperatives, particularly concerns about transparency and past leadership challenges. This aligns with Makundi and Thomas (2023), who noted that governance quality and leadership trust

significantly shape farmers' confidence in cooperative-led investments. Non-members, on the other hand, expressed enthusiasm about the processing plant as a fresh opportunity for market access and future inclusion in cooperative structures. For them, the proposed investment represents a doorway to economic participation rather than a continuation of past experiences, thus explaining their higher investment enthusiasm. Comparative analysis using t-tests revealed statistically significant differences in only a few cooperative values. For example, non-members scored significantly higher on integrity, while members scored higher on solidarity. These contrasts reflect how farmers' lived experiences influence their perceptions: members evaluate values based on ongoing cooperative performance, whereas non-members may project ideal expectations of what cooperatives should embody. While some values showed no statistically significant differences, the overall pattern suggests that both identity-based (cultural) and experience-based (institutional) factors shape how farmers perceive cooperative functioning. The inferential results, after addressing multicollinearity through PCA, offered deeper insights into determinants of investment willingness. Two principal components, namely: CV3 (solidarity and community cohesion) and CV4 (transparency-related operational values) were strong predictors of willingness to invest. In this case, the predictive strength of CV3 and CV4 reinforces the idea that willingness to invest is fundamentally value-driven, regardless of membership status. The strong influence of cooperative value components aligns with the TPB's attitude dimension: farmers with strong beliefs in fairness, collective effort, and mutual support

form more positive attitudes toward investing in a processing plant. The results also highlight the role of subjective norms: both members and non-members reported that community expectations, peer influence, and trust in collective identity shape their investment decisions. The limited effect of demographic variables further supports the TPB proposition that behavioural intentions in collective rural settings are shaped more by belief systems and perceived social expectations than by age, gender, or education. Overall, the findings illustrate that willingness to invest in a dairy processing cooperative is strongly value-driven and shaped by perceptions of governance, transparency, and collective identity. These results reinforce the need for strengthening cooperative governance, fostering openness, and deepening cooperative education to build investor confidence across the broader dairy community in Tanzania and East Africa in general.

CONCLUSIONS

This study set out to examine the factors influencing dairy farmers' willingness to invest in a cooperative-owned processing plant in Sanya Juu. The findings show that investment decisions are shaped far more by cooperative values, particularly solidarity, community cohesion, transparency, and fairness than by demographic factors such as age, sex, or education. The unexpected but important finding is that, non-members demonstrated slightly higher willingness to invest than cooperative members, largely due to their optimism about new opportunities and desire for future inclusion, while some members expressed reservations linked to governance and transparency concerns. Higher willingness of non-members provides potential for increased membership in dairy cooperatives in the area. The policy

implications are clear: strengthening cooperative governance, enhancing transparency, and embedding continuous cooperative education are essential for mobilizing broad-based investment. Policies promoting inclusive shareholding models, flexible financing mechanisms, and strong oversight of cooperative accountability will be critical to harnessing both member and non-member enthusiasm.

RECOMMENDATIONS

To strengthen farmer participation in establishing a dairy processing cooperative plant, the Sanya Juu cooperatives should prioritise open communication, regular feedback meetings, and clear financial reporting to build trust among both members and non-members. Cooperative education programs should be practical and ongoing, helping farmers understand how values such as solidarity, fairness, and shared responsibility translate into real economic benefits. Moshi Cooperative University in collaboration with Tanzania Cooperative Development Commission (TCDC) should design continuous learning programmes on cooperative education and investment. To finance the dairy processing plant, investment packages should be flexible, allowing small but regular contributions so that even liquidity-constrained households can participate. Because non-members have shown high enthusiasm for the proposed plant, cooperatives should offer inclusive shareholding arrangements and transparent benefit-sharing mechanisms to encourage broader community ownership. Given the limited sample area and sample size, future studies should cover other parts of Tanzania with similar characteristics. Further, longitudinal and time series studies could be used to mitigate self-reporting biases emanating from Likert scale data.

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This research report is based entirely on original fieldwork, analysis, and interpretation conducted by the authors. AI tools, such as language models, were used solely to enhance grammar, structure, and clarity of expression. The substantive content, arguments, and conclusions are entirely the authors' own.

Statement of Conflict of Interest

The authors declare that there is no conflict of interest associated with this research. All data were collected, analysed, and reported independently, without any financial, personal, or institutional influence that could affect the integrity or objectivity of the study.

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