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Investigating the Determinants of Cooperative Growth in Maize Agribusiness in Zambia: A Case Study of Kawambwa District

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Abstract

This study investigated the determinants of cooperative growth in maize agribusiness in Zambia, using Kawambwa District as a case study. It examined the relationships between agricultural-input access, financial access, technology adoption and market access and cooperative growth. Guided by the Resource-Based View, the study adopted a positivist philosophy and quantitative cross-sectional design. Structured questionnaire data were obtained from 96 respondents representing 40 maize agribusiness cooperatives. Descriptive statistics, Pearson product-moment correlations and multiple linear regression were used. Cooperative governance was included as a control and contextual variable in the primary regression model; a supplementary interaction analysis considered its possible moderating role. Agricultural-input access was positively associated with growth ($r = .663$, $p < .001$) and made a significant independent contribution ($\beta = .195$, $p = .021$). Market access had the strongest bivariate relationship among the four focal determinants ($r = .706$, $p < .001$) and remained significant in the regression model ($\beta = .295$, $p = .001$). Financial access was positively but not significantly related to growth ($r = .180$, $p = .079$; $\beta = .004$, $p = .948$). Technology adoption was positively correlated with growth ($r = .547$, $p < .001$), but its independent contribution was not significant ($\beta = .056$, $p = .495$). Governance had the largest standardised coefficient ($\beta = .414$, $p < .001$). The model was significant, $R = .827$, $R^2 = .683$, adjusted $R^2 = .666$, $F(5, 90) = 38.865$, $p < .001$. The findings indicate that cooperative growth is associated with productive-resource access and the capacity to organise and deploy resources effectively. The study recommends strengthening timely input access and collective marketing while aligning finance and technology interventions with cooperative governance and market opportunities. The findings are limited to the cross-sectional Kawambwa case and should not be interpreted as definitive causal effects.

Keywords: Cooperative Growth, Maize Agribusiness, Agricultural-Input Access, Financial Access, Technology Adoption, Market Access, Cooperative Governance, Zambia

1. Introduction

1.1 Background and context

Agricultural cooperatives provide an organisational mechanism through which smallholder farmers can combine resources, coordinate production and participate in agricultural value chains. Individual farmers often face constraints related to scale, information, finance, infrastructure and bargaining power that are difficult to overcome independently. Through collective action, cooperatives can pool demand for inputs, aggregate produce and strengthen access to services and markets. Membership alone, however, does not guarantee growth. The resources available to a cooperative and its ability to organise and use those resources effectively are important to its performance. Research on collective action indicates that producer organisation can reduce transaction costs, improve information flows and strengthen the economic position of smallholder producers [1, 2].

The Resource-Based View (RBV) provides the theoretical foundation for this study. It explains organisational performance in terms of the resources and capabilities available to an organisation and the way these are organised and deployed [3]. In maize agribusiness, agricultural inputs, financial resources, appropriate technology and market relationships constitute important resource-related conditions for production and commercial activity. The value of a resource depends not simply on its presence but on whether it can be accessed at the right time, combined with complementary resources and used to generate economic

returns. Organisational differences can therefore influence the performance achieved from similar resource endowments [4].

Maize agribusiness depends on timely and adequate productive resources. Quality seed and fertiliser provide basic requirements for production, while finance supports input procurement, storage, transport and other operating activities. Technology may improve production efficiency and reduce losses, while market access enables cooperatives to convert output into sales and revenue. These resources are interconnected. A cooperative may have access to one resource but still experience limited growth if other complementary resources or commercial opportunities are inadequate.

In Zambia, cooperatives play an important role in organising smallholder farmers and facilitating participation in agricultural activities. Evidence indicates that cooperative-affiliated households use more hybrid maize seed and fertiliser and achieve higher maize yields, while cooperative membership can increase the probability and speed of adopting improved agricultural technologies [5, 6]. Nevertheless, agricultural productivity, mechanisation, infrastructure, affordable finance and participation in value chains remain important contextual challenges. Financial access matters because cooperatives need working capital at different stages of production and marketing, often before sales revenue is realised. Technology adoption is similarly affected by finance, skills, infrastructure and suitability to local production conditions. Market access depends on reliable buyers, information, prices, transport and commercial linkages [7, 8].

Kawambwa District offers a local setting in which to examine these relationships. Maize and other agricultural activities form part of the rural economy, while cooperatives provide a platform for production, resource mobilisation and market participation. The study therefore focuses on four determinants—agricultural-input access, financial access, technology adoption and market access—and examines their relationships with cooperative growth in maize agribusiness. Growth is considered multidimensionally through productivity, profitability, assets, business expansion, employment, competitiveness, household income and overall growth.

1.2 Problem statement and research gap

Agricultural cooperatives are expected to support smallholder commercialisation by pooling resources, facilitating access to agricultural services, aggregating produce and strengthening bargaining power. Yet some cooperatives remain small, experience irregular business activity or lack the productive and commercial capabilities required to expand. The central issue is whether resources and conditions available to maize agribusiness cooperatives are sufficiently accessible and effectively utilised to support improvements in productivity, profitability, assets, employment, competitiveness and business expansion.

Existing Zambian research has examined particular mechanisms: cooperative membership and input use or maize yields [5], technology adoption [6], rural financial participation [9], transaction costs and maize-market participation [7], and collective marketing in Kawambwa and neighbouring districts [8]. These studies provide important evidence, but they do not jointly examine agricultural-input access, financial access, technology adoption and market access against a multidimensional measure of cooperative growth in the same district-level quantitative framework. Evidence from households or individual farmers cannot automatically establish whether a cooperative itself expands its assets, sales, membership, employment or operations.

The resulting gap is empirical and geographical. There is limited district-specific quantitative evidence showing the relative contribution of the four determinants when considered simultaneously. A factor may appear positively associated with growth when examined separately but may not retain a statistically significant independent contribution after related factors and organisational conditions are taken into account. This study addresses that gap using primary quantitative data from 96 respondents drawn from 40 maize agribusiness cooperatives in Kawambwa District. Its findings are intended to inform cooperative leaders, members, government agencies, financial institutions, input suppliers and other agribusiness stakeholders, while remaining appropriately bounded to the study context.

1.3 Objective and research questions

The general objective was to investigate the determinants of cooperative growth in maize agribusiness in Kawambwa District, Zambia. The specific objectives were to determine the relationship between agricultural-input access and cooperative growth; examine the relationship between financial access and cooperative growth; assess the relationship between technology adoption and cooperative growth; and investigate the relationship between market access and cooperative growth. The corresponding research questions asked what relationship exists between each of these four determinants and cooperative growth in maize agribusiness in Kawambwa District.

2. Theoretical and Empirical Literature

2.1 Resource-Based View

The study is anchored in the Resource-Based View advanced by Barney [3]. The RBV explains differences in organisational performance by examining the resources and capabilities that an organisation can access, control, coordinate and deploy. In a cooperative context, resources are assembled collectively and their use requires coordination among members, leadership and management. Agricultural inputs represent productive resources; financial access represents the funds needed for acquisition, operations and investment; technology adoption represents productive and organisational capability; and market access represents a commercial capability through which output is converted into sales and revenue.

The framework also recognises cooperative governance as an organisational condition. Leadership effectiveness, member participation, transparency, accountability, training and resource mobilisation can influence how the four focal determinants are coordinated and used. The study therefore treats governance as a control and contextual variable in the primary model rather than as a fifth substantive objective. This distinction is important: the analysis asks whether the four focal determinants retain independent statistical contributions while governance and the other determinants are held constant.

2.2 Agricultural-input access and cooperative growth

Agricultural-input access concerns the ability to obtain production resources in appropriate quantities, quality, price

and time. It includes improved maize seed, fertiliser, affordability, timely delivery, government support programmes and the perceived contribution of inputs to productivity and expansion. Physical availability alone does not guarantee effective access: prices may be unaffordable, deliveries delayed, information inadequate or members unable to finance the required quantities. Improved inputs can raise output and marketable surplus, but the resulting gains depend on complementary resources such as finance, extension, storage, technology and markets.

International evidence links improved maize technology to higher farm earnings and trade, while research on stress-resilient hybrids highlights the role of credit and field demonstrations in adoption [10, 11]. Across eastern and southern Africa, adoption of drought-tolerant maize varies with seed availability, price, information and resource constraints [12]. Evidence from Malawi further indicates that subsidies can promote use even where yield performance varies across smallholder environments [13]. These studies caution against assuming that an input intervention produces identical outcomes across contexts.

For Zambia, Blekking *et al*. [5] found that cooperative-affiliated households used more hybrid seed and fertiliser and achieved higher maize yields, identifying reduced transport and transaction costs as potential collective benefits. Research on drought-tolerant maize also indicates productivity and risk-management benefits [14]. These findings support the relevance of inputs but primarily focus on household input use, yield or production risk rather than multidimensional cooperative growth. The present study extends the focus to perceived input access and cooperative-level growth.

2.3 Financial access and cooperative growth

Financial access refers to the availability and use of credit, savings and other financing options that support cooperative operations. Maize cooperatives may require finance for input procurement, aggregation, storage, machinery, transport and working capital before sales revenue is received. Nominal availability does not necessarily constitute effective access. Loan size, collateral, interest, repayment schedules, timing and the match between financing terms and the agricultural cycle can determine whether finance can be used productively. Savings mobilisation and reliable financial records may also influence a cooperative's ability to obtain and manage external funding.

The literature reviewed in the thesis identifies finance as a recurring constraint for agricultural enterprises and smallholder producers. Studies on rural financial participation in Zambia identify factors associated with farmers' access to agricultural finance [9], while broader work on small-enterprise finance considers access to finance as a potential growth constraint [15, 16]. Evidence on agricultural finance in Africa also emphasises the distinctive risks and financing needs of agricultural businesses [17]. These findings establish the importance of finance as a plausible resource but do not imply that every measure of access will show a direct independent relationship with cooperative growth in every setting.

For a cooperative, finance is likely to be most valuable when it is aligned with productive uses and supported by governance, business planning and market opportunities. Credit without reliable buyers can increase exposure to repayment risk; technology finance may be underused if operating skills and maintenance are weak; and input finance may not yield commercial returns if procurement is late. The present analysis therefore distinguishes the perceived level of financial access from its bivariate association and independent contribution to cooperative growth.

2.4 Technology adoption and cooperative growth

Technology adoption includes improved agricultural practices, improved seed varieties, mechanisation, digital tools and post-harvest technologies. Appropriate technology can support productivity, efficiency and loss reduction. However, adoption depends on affordability, skills, infrastructure, maintenance and fit with local production and marketing conditions. Acquisition alone does not ensure sustained use or measurable organisational benefits. For cooperatives, technology may also require collective decisions about ownership, operator training, cost sharing and scheduling.

Manda *et al*. [6] found that cooperative membership increased and accelerated agricultural technology adoption in Zambia. Research on sustainable agricultural practices and maize outcomes provides further context for the relationship between technology and productivity [18]. However, adoption and productivity outcomes do not necessarily translate into cooperative-level growth. The contribution of technology may overlap with inputs, finance and markets, making multivariate analysis useful for distinguishing a simple association from an independent contribution.

2.5 Market access and cooperative growth

Market access refers to the ability to reach reliable and profitable markets through buyer linkages, contracts, market information and related commercial arrangements. Production does not automatically produce growth unless output can be sold under viable conditions. Price information, distance, transport, storage, quality requirements and transaction costs affect the ability of cooperatives to aggregate and market maize. Collective marketing may improve bargaining and reduce individual transaction costs, but it also requires coordination, transparent sales processes and dependable supply volumes.

Research on maize-market participation in Zambia highlights the role of transaction costs [7], while studies of seasonal market participation consider the relevance of input subsidies and gender [19]. Work on cooperative marketing linkages emphasises the need to connect producers with product markets [20], and studies in Zambia have examined marketing linkages among cooperatives [21]. A review of output-market-access interventions found that market access can influence agricultural and socioeconomic outcomes, although effects vary by intervention and context [22]. Evidence from Southern Ethiopia also identifies demographic, socioeconomic and institutional factors associated with maize-market participation [23]. These studies reinforce the importance of markets but often examine participation, household outcomes or specific interventions rather than the broader growth of cooperatives.

2.6 Synthesis and analytical contribution

Across the four thematic areas, the literature points to a common principle: cooperative growth is unlikely to result

from one resource operating in isolation. Inputs establish productive capacity, finance enables mobilisation and timing, technology can improve productivity and efficiency, and market access creates the commercial pathway for value realisation. The institutional capacity of the cooperative affects how these resources are coordinated. The literature also varies in geographical context, unit of analysis and measurement. Studies of individual farmers or households cannot be transferred uncritically to cooperative-level outcomes, and cross-sectional studies identify associations rather than definitive causal effects.

This study contributes a district-specific quantitative assessment that uses a common cooperative-growth outcome and tests the four focal determinants in one model. Pearson correlation describes the direction and strength of bivariate relationships, while multiple regression estimates each predictor's independent contribution after accounting for the others and governance. The study does not claim national representativeness or experimental causality; its contribution is a comparative empirical assessment within the Kawambwa case.

3. Methodology

3.1 Research philosophy and design

The study adopted a positivist research philosophy because it examined measurable constructs and statistically assessed relationships among agricultural-input access, financial access, technology adoption, market access and cooperative growth. A quantitative cross-sectional design was used to collect standardised numerical data at one period. This design was suitable for describing perceptions and estimating associations among the study constructs. Because observations were cross-sectional and based on respondent perceptions, regression estimates are interpreted as statistical associations or predictive relationships rather than proof of causation.

3.2 Study setting, population and sample

The study was conducted in Kawambwa District, Luapula Province, Zambia, and focused on maize agribusiness cooperatives. The thesis reports 96 respondents representing 40 cooperatives. Respondents included cooperative leaders, ordinary members, committee members, managers and other participants with knowledge of cooperative activities. The resulting sample provided the observations used in the descriptive, correlation and regression analyses. The study's geographic and organisational boundaries mean that findings should be interpreted primarily in relation to the sampled maize cooperatives in Kawambwa.

3.3 Data collection and measurement

Primary data were collected using a structured questionnaire. The questionnaire operationalised the four determinants through multiple items and measured cooperative growth through perceived changes in productivity, profitability, assets, business expansion, employment, competitiveness, household income and overall growth. Items captured dimensions such as input availability and affordability, credit and savings, mechanisation and digital technologies, market information and transport, and governance practices. Responses were summarised as construct-level measures for statistical analysis. The use of multi-item perception measures offered more nuance than a single binary indicator, while still depending on respondents' understanding and assessment of the statements.

3.4 Data analysis

Data were analysed using descriptive statistics, Pearson product-moment correlation and multiple linear regression. Frequencies and percentages described respondent characteristics. Construct means and standard deviations summarised perceptions. Pearson correlation coefficients assessed bivariate relationships between each determinant and cooperative growth. Multiple regression estimated independent contributions while controlling for the other focal determinants and cooperative governance. Statistical significance was assessed using the reported p-values, with $p < .05$ treated as statistically significant. Model fit was evaluated using R, R^2, adjusted R^2 and the overall F-statistic. The primary regression model can be represented as: Cooperative Growth = $\beta_0 + \beta_1$(Input Access) + β_2(Financial Access) + β_3(Technology Adoption) + β_4(Market Access) + β_5(Governance) + ε. Governance was included as a control and contextual variable. A supplementary governance interaction analysis was also reported in the thesis; because the core objectives concern the four determinants, the article treats this analysis as contextual rather than as a separate objective. Regression diagnostics included variance inflation factors, a Shapiro–Wilk test of residual normality, the Durbin–Watson statistic and a Breusch–Pagan test for heteroscedasticity. HC3 heteroscedasticity-consistent estimates were also examined.

3.5 Ethical considerations and limitations

The thesis states that the research was conducted in accordance with accepted principles of academic integrity, ethical research practice and responsible reporting. Participants' cooperation made primary data collection possible. The article reports only aggregated statistics and does not identify individual respondents. The main limitations arise from the cross-sectional design, self-reported perception measures and district-specific sample. The study cannot establish temporal order or definitive causal effects, and its results should not be generalised statistically to every maize cooperative in Zambia. The findings nevertheless provide useful local evidence for cooperative management and further research.

4. Results

4.1 Respondent characteristics

The sample comprised 96 respondents. Men represented 68 respondents (70.8%) and women 28 (29.2%). The largest age category was 18–25 years (32.3%), followed by respondents above 55 years (19.8%), those aged 36–45 years (17.7%), 26–35 years (16.7%) and 46–55 years (13.5%). In educational attainment, secondary education was the most frequently reported level (38.5%), followed by primary education (24.0%), certificate (19.8%), diploma (10.4%), degree (6.2%) and postgraduate qualification (1.0%).

Cooperative leaders accounted for 41 respondents (42.7%), ordinary members 38 (39.6%), other positions 11 (11.5%), committee members four (4.2%) and managers two (2.1%). Regarding membership duration, 40 respondents (41.7%) had been members for two to five years, 28 (29.2%) for less than two years, 17 (17.7%) for six to ten years and 11 (11.5%) for more than ten years. Production was the most

frequently reported main maize agribusiness activity (54.2%), followed by multiple activities (29.2%) and marketing (12.5%); processing accounted for 4.2%, while no respondent selected storage as the main activity. These characteristics describe the respondents and provide context for interpreting the construct results.

Table 1: Respondent Profile (N = 96)

Characteristic	Category	n	%
Gender	Male	68	70.8
	Female	28	29.2
Age	18–25 years	31	32.3
	26–35 years	16	16.7
	36–45 years	17	17.7
	46–55 years	13	13.5
	Above 55 years	19	19.8
Education	Primary	23	24.0
	Secondary	37	38.5
	Certificate	19	19.8
	Diploma	10	10.4
	Degree	6	6.2
	Postgraduate	1	1.0

4.2 Descriptive statistics for study constructs

Financial access recorded the highest mean among the four focal determinants (M = 3.417, SD = 0.508). Technology adoption had a mean of 2.966 (SD = 0.840), market access 2.948 (SD = 0.814), and agricultural-input access 2.852 (SD = 0.693). Cooperative governance recorded a mean of 2.931 (SD = 0.949), while cooperative growth had a mean of 3.169 (SD = 0.977). These descriptive means indicate the relative average ratings in the sample; they do not by themselves establish whether a construct independently predicts growth.

Table 2: Construct-Level Descriptive Statistics

Construct	N	Mean	SD
Agricultural-input access	96	2.852	0.693
Financial access	96	3.417	0.508
Technology adoption	96	2.966	0.840
Market access	96	2.948	0.814
Cooperative governance	96	2.931	0.949
Cooperative growth	96	3.169	0.977

4.3 Agricultural-input access

Agricultural-input access had a mean of 2.852 and standard deviation of 0.693. Item-level means reported in the thesis show that timely delivery had a mean of 3.042, government support programmes improving access 3.021, affordability 2.823, improved seed availability 2.760, perceived productivity improvement 2.698 and fertiliser accessibility 2.594. The item concerning the negative effect of input shortages on cooperative growth recorded a mean of 3.354. The pattern suggests that respondents recognised the importance of inputs but reported mixed assessments of availability, affordability and access. The construct's correlation with cooperative growth was positive and statistically significant ($r = .663$, $p < .001$). In the full regression model, input access retained a positive independent contribution ($\beta = .195$, $p = .021$; $B = .274$, $SE = .117$).

4.4 Financial access

Financial access recorded the highest mean of the four focal determinants (M = 3.417, SD = 0.508). Item means included 3.823 for perceived accessibility of financial services in the district, 3.781 for reasonableness of loan requirements, 3.719 for access to agricultural credit facilities, 3.677 for institutional support to cooperatives, 3.292 for the contribution of cooperative savings, 3.000 for finance enabling business expansion and 2.875 for the statement that high interest rates discourage borrowing. Despite the comparatively high construct mean, the correlation with cooperative growth was weak and not statistically significant at the .05 level ($r = .180$, $p = .079$). The independent regression coefficient was also not significant ($\beta = .004$, $p = .948$; $B = .008$, $SE = .122$). Therefore, the analysis does not establish an independent statistical contribution of financial access in the full model.

4.5 Technology adoption

Technology adoption recorded a mean of 2.966 and standard deviation of 0.840. Access to mechanised equipment had an item mean of 3.417 and availability of improved storage technologies 3.156. Digital technologies assisting business operations recorded a mean of 2.948, perceived reduction of losses 2.990, productivity improvement 2.927, use of modern farming technologies 2.865 and widespread adoption of improved maize varieties 2.552. The construct was positively associated with cooperative growth at the bivariate level ($r = .547$, $p < .001$). However, after controlling for input access, financial access, market access and governance, its independent contribution was not statistically significant ($\beta = .056$, $p = .495$; $B = .065$, $SE = .095$). This distinction indicates that a positive correlation should not be interpreted as evidence of a unique effect after related variables are considered.

4.6 Market access

Market access had a mean of 2.948 and standard deviation of 0.814. Transport infrastructure supporting market access had an item mean of 3.406, favourable market prices 3.188, market information availability 3.021 and reliable markets for maize products 2.927. Government marketing programme support recorded 2.896, the perceived contribution of market access to cooperative growth 2.865, and the statement that access to markets increases sales volumes 2.625. Market access had the strongest bivariate association with cooperative growth among the four focal determinants ($r = .706$, $p < .001$). It also retained a statistically significant independent contribution in the full regression model ($\beta = .295$, $p = .001$; $B = .354$, $SE = .105$). This result highlights the importance of commercial connections in translating production into organisational performance.

4.7 Correlation analysis

Pearson correlation results showed positive relationships between cooperative growth and input access ($r = .663$), financial access ($r = .180$), technology adoption ($r = .547$), market access ($r = .706$) and governance ($r = .761$). The relationships for input access, technology adoption, market access and governance were reported as statistically significant at $p < .001$; financial access was not significant ($p = .079$). The correlation matrix also showed that market access was positively correlated with technology adoption ($r = .621$), governance ($r = .642$) and input access ($r = .563$). Input access and governance were correlated at $r = .660$.

These interrelationships support the use of multivariate analysis because the constructs are not entirely independent of one another.

Table 3: Pearson Correlations with Cooperative Growth

Construct	Pearson r	p-value	Interpretation
Agricultural-input access	.663	< .001	Positive, significant
Financial access	.180	.079	Positive, not significant
Technology adoption	.547	< .001	Positive, significant
Market access	.706	< .001	Positive, significant
Cooperative governance	.761	< .001	Positive, significant

4.8 Multiple regression model

The overall multiple regression model was statistically significant, $R = .827$, $R^2 = .683$, adjusted $R^2 = .666$, $F(5, 90) = 38.865$, $p < .001$. The model explained 68.3% of the observed variance in cooperative growth, with adjusted R^2 indicating 66.6% after adjustment for the number of predictors and sample size. The remaining variance is not explained by the predictors included in this model and may reflect other conditions not assessed in the study. The model's explanatory strength should be understood within the sample and design rather than as evidence of causal effects.

Table 4: Multiple Regression Coefficients Predicting Cooperative Growth

Predictor	B	β	SE	t	p
Agricultural-input access	.274	.195	.117	2.355	.021
Financial access	.008	.004	.122	.065	.948
Technology adoption	.065	.056	.095	.685	.495
Market access	.354	.295	.105	3.374	.001
Cooperative governance	.426	.414	.091	4.699	< .001

Agricultural-input access and market access remained significant positive predictors after adjustment for the other variables. Input access had $\beta = .195$ ($p = .021$), while market access had $\beta = .295$ ($p = .001$). Financial access ($\beta = .004$, $p = .948$) and technology adoption ($\beta = .056$, $p = .495$) did not show statistically significant independent contributions. Governance had the largest standardised coefficient ($\beta = .414$, $p < .001$). These results indicate that the variables with the highest bivariate associations do not necessarily have the largest independent contributions once overlap among the predictors is accounted for.

4.9 Model diagnostics and robustness

Variance inflation factors were 1.945 for input access, 1.145 for financial access, 1.887 for technology adoption, 2.174 for market access and 2.205 for governance. These values do not indicate severe multicollinearity under commonly used diagnostic rules. The Shapiro–Wilk test for residual normality was $W = .977$, $p = .087$, and the Durbin–Watson statistic was 1.819. However, the Breusch–Pagan test indicated heteroscedasticity (LM $p = .022$; F $p = .020$), which warrants caution with conventional standard errors. The thesis therefore also reported HC3 heteroscedasticity-consistent estimates.

Table 5: Diagnostics and HC3 Robustness Check

Diagnostic / predictor	Result
VIF: input access	1.945
VIF: financial access	1.145
VIF: technology adoption	1.887
VIF: market access	2.174
VIF: governance	2.205
Shapiro–Wilk residual test	W = .977, p = .087
Durbin–Watson	1.819
Breusch–Pagan	LM p = .022; F p = .020
HC3: input access	B = .274, t = 2.339, p = .022
HC3: financial access	B = .008, t = .051, p = .959
HC3: technology adoption	B = .065, t = .735, p = .464
HC3: market access	B = .354, t = 3.120, p = .002
HC3: governance	B = .426, t = 4.598, p < .001

The HC3 results preserve the substantive pattern: input access remained significant ($p = .022$), market access remained significant ($p = .002$), governance remained significant ($p < .001$), while finance ($p = .959$) and technology adoption ($p = .464$) remained non-significant. The main inferences are therefore robust to the reported heteroscedasticity-consistent adjustment. The diagnostic results do not remove all limitations of cross-sectional perception data, but they provide a more cautious basis for interpreting the coefficients.

4.10 Governance as a contextual factor

Governance had a mean of 2.931 (SD = .949), a positive correlation with cooperative growth ($r = .761$, $p < .001$) and the largest standardised coefficient in the primary regression model ($\beta = .414$, $p < .001$). The thesis also considered governance interaction effects in a supplementary moderation model. These supplementary results are not treated as a fifth objective and do not alter the four-objective structure of the study. The central finding for this article is that governance was statistically important as a control/contextual variable. This is consistent with the RBV interpretation that organisational capabilities influence how resources are coordinated and deployed.

5. Item-Level Analysis

5.1 Input-access item patterns

The item-level evidence is useful because a construct mean can conceal operational differences among the dimensions of access. For agricultural inputs, timely delivery and government support programmes received mean ratings slightly above 3.0, while fertiliser accessibility and perceived productivity improvement received lower means. The shortage item received the highest mean within the reported input block. The results therefore suggest that the perceived problem is not simply whether inputs exist in the district, but whether cooperatives and members can obtain suitable inputs when needed and use them in a way that supports production. The thesis defines input access to include quality, quantity, affordability and timeliness; the pattern of responses supports retaining these dimensions in cooperative planning rather than treating access as a single

supply indicator.

The standard deviations for the input items ranged from 1.152 for affordability to 1.478 for improved seed availability, indicating variation in respondent assessments. Such variation may reflect differences in cooperative circumstances, experiences with distribution, member purchasing capacity or the timing of access. The present data do not establish which of these explanations accounts for the differences. They do, however, indicate that a single district-wide statement about input access would conceal variation among respondents. Cooperative managers can use this type of item-level review to identify specific bottlenecks for discussion with suppliers and agricultural-support institutions.

Table 6: Agricultural-Input Access Item Means

Item	Questionnaire dimension	Mean	SD
B1	Improved maize seed available when needed	2.760	1.478
B2	Fertiliser accessible to members	2.594	1.302
B3	Inputs affordable	2.823	1.152
B4	Inputs delivered on time	3.042	1.289
B5	Government support improves input access	3.021	1.436
B6	Input access improves maize productivity	2.698	1.370
B7	Input shortages negatively affect growth	3.354	1.465

5.2 Financial-access item patterns

The financial-access items show a difference between respondents' ratings of the presence of financial services and their assessment of the contribution of finance to business expansion. Financial services in the district received a mean of 3.823, and loan requirements received 3.781, whereas the statement that access to finance enables cooperative business expansion received a mean of 3.000. Cooperative savings received a mean of 3.292. The high-interest-rate item had a mean of 2.875; because the item is phrased as a constraint, its mean should not be interpreted in the same direction as positively worded access items without considering the questionnaire's coding approach. This is a measurement consideration, not a basis for recalculating the reported construct results.

This pattern illustrates why descriptive ratings and regression estimates answer different questions. Respondents may recognise the existence of financial services, but the study's regression did not establish a unique relationship between the aggregate financial-access measure and cooperative growth. The result may be consistent with a gap between service availability and the ability to use finance at the scale, timing and cost required by maize agribusiness. However, the present study did not directly test mediation pathways or the detailed terms of individual loans, so such explanations remain interpretive possibilities rather than empirical findings.

Table 7: Financial-Access Item Means

Item	Questionnaire dimension	Mean	SD
C1	Access to agricultural credit facilities	3.719	1.167
C2	Financial-institution support to cooperatives	3.677	1.031
C3	Reasonableness of loan requirements	3.781	1.233
C4	Cooperative savings improve finance access	3.292	1.391
C5	Finance enables business expansion	3.000	1.346
C6	High interest rates discourage borrowing	2.875	1.578
C7	Financial services easily accessible in district	3.823	1.133

5.3 Technology-adoption item patterns

The technology results point to differences between access to equipment and adoption of improved production practices. Mechanised equipment had a mean of 3.417, and improved storage technologies had a mean of 3.156, while widespread adoption of improved maize varieties had a mean of 2.552. Use of modern farming technologies was rated at 2.865. Digital technologies assisting business operations had a mean of 2.948. The observed pattern is consistent with the need to distinguish equipment availability, adoption of improved varieties, digital use and the actual results attributed to technology. These are related but not identical dimensions.

The standard deviations for technology items ranged from 1.272 to 1.538, demonstrating appreciable variation in respondents' ratings. The item-level evidence does not identify the reasons for this variation, but it suggests that a technology intervention designed for all cooperatives in the same way may not address different needs equally. A cooperative may require access to machinery, while another may need training, improved seed, storage or digital information. The non-significant independent regression coefficient also cautions against equating the presence of technology with a separate growth contribution once other determinants and governance are considered.

Table 8: Technology-Adoption Item Means

Item	Questionnaire dimension	Mean	SD
D1	Modern farming technologies used	2.865	1.519
D2	Mechanised equipment accessible	3.417	1.397
D3	Improved maize varieties widely adopted	2.552	1.272
D4	Digital technologies assist operations	2.948	1.461
D5	Improved storage technologies available	3.156	1.538
D6	Technology has increased productivity	2.927	1.394
D7	Technology has reduced losses	2.990	1.310

5.4 Market-access item patterns

The market-access item means suggest that transport infrastructure and perceived price conditions were rated more favourably than the direct contribution of market access to sales volumes. Transport infrastructure supporting market access received a mean of 3.406, while market prices were rated at 3.188 and market information at 3.021. The item that access to markets increases sales volumes received a mean of 2.625. This difference is important because market access includes several stages: obtaining information, reaching buyers, meeting delivery requirements and converting production into completed sales. A favourable rating on one stage does not necessarily mean that the entire marketing process is effective.

The significant correlation and regression coefficient for market access indicate that the aggregate construct was strongly associated with cooperative growth, even though individual items were not uniformly rated. The results therefore support attention to the whole marketing process, including buyer identification, market information, price comparison, transport, storage and transparent sale arrangements. They do not establish which specific item is the most influential because the regression model used the construct-level measure rather than testing each item as a separate predictor.

Table 9: Market-Access Item Means

Item	Questionnaire dimension	Mean	SD
E1	Reliable markets for maize products	2.927	1.530
E2	Market information easily available	3.021	1.392
E3	Transport infrastructure supports access	3.406	1.470
E4	Government marketing programmes support cooperatives	2.896	1.518
E5	Market prices generally favourable	3.188	1.510
E6	Market access increases sales volumes	2.625	1.446
E7	Market access contributes to business growth	2.865	1.455

6. Implications for Cooperative Management and Support Programmes

6.1 Translating statistical results into priorities

The regression results suggest a practical hierarchy for immediate attention without implying that non-significant variables should be abandoned. Input access and market access are the two focal determinants that retained significant independent contributions. This supports prioritising the reliability of input procurement and the commercial arrangements through which maize is sold. The conclusion should not be read as a claim that finance and technology are unnecessary. Rather, it indicates that their unique contributions were not statistically established in the current model. Their implementation can be aligned with the significant pathways by ensuring that finance is used to acquire timely inputs or facilitate marketing and that technology addresses identified production, storage or marketing constraints.

Cooperative planning can use the sequence of the maize business cycle to coordinate these interventions. Before planting, members can estimate production requirements and agree procurement schedules. During production, cooperatives can monitor input use and determine whether technology, training or other support is required. Before harvest, leaders can identify potential buyers, expected volumes, quality requirements, storage needs, transport arrangements and the cash required to move produce. After sales, records of quantities, prices, expenses, payment dates and reinvestment can inform the next cycle. This proposed sequence follows from the interconnected nature of the study constructs and is a practical recommendation, not an intervention tested in the research.

6.2 Cooperative governance as an enabling capability

Governance is relevant because cooperative resources are held or mobilised collectively and decisions affect multiple members. The observed governance coefficient was larger than the coefficients for the four focal determinants, and its bivariate relationship with growth was also strong. The study's governance construct included effective leadership, member participation, transparency and accountability, training and support, and resource mobilisation. These dimensions can be incorporated into routine management through documented decisions, clear procurement and sales procedures, member communication, regular financial records and review of business performance. The study does not identify which governance item accounts for the coefficient, so the recommendation is to treat the construct as a whole rather than claim that one governance practice has been independently proven to drive growth.

Governance also matters for trust. Input procurement and sales often involve pooled contributions, shared assets or collective negotiations. Where members understand how decisions are made and how revenues are recorded and distributed, cooperative action may be easier to sustain. The present study did not directly measure trust as a separate construct, and it would be inappropriate to present trust as a tested predictor. Nevertheless, transparent processes and member participation are already included in the thesis's operational definition of governance and are therefore legitimate areas for practical attention.

6.3 Implications for public and development-sector support

Public and development-sector interventions can use the findings to coordinate rather than separate support activities. Input support may be designed alongside extension and market planning; financial institutions can assess seasonal cash flows and realistic business uses; technology support can include operator training and maintenance; and market actors can provide information about volumes, quality and delivery arrangements. The evidence does not justify a one-size-fits-all intervention, and it does not establish the impact of any particular programme. It does, however, support a planning approach that connects resources to the operational conditions in which cooperatives use them.

Monitoring should distinguish outputs from outcomes. Counting input packs delivered, loans issued or equipment purchased is not the same as measuring whether a cooperative improves productivity, profitability, assets, employment, competitiveness, sales or income. The study's multidimensional growth measure offers a conceptual basis for tracking such outcomes. A practical monitoring framework could record a baseline before each production cycle and review changes after harvest and marketing, while maintaining comparable definitions over time. Repeated measurement would also help future researchers address the cross-sectional limitation of the present study.

6.4 Suggested implementation and monitoring framework

Table 10: Implementation Priorities Derived from the Study

Priority area	Suggested action	Illustrative monitoring evidence
Input access	Seasonal planning, collective procurement, quality and timely delivery	Procurement date; proportion of planned inputs obtained before planting; member distribution records
Financial access	Align financing with seasonal cash flow and productive uses	Loan timing and purpose; repayment schedule; cash-flow and savings records
Technology adoption	Match technology to needs; train users; plan maintenance	Utilisation records; trained operators; maintenance and operating-cost records
Market access	Identify buyers; compare prices; coordinate storage and transport	Buyer contacts; marketed volume; prices received; transport costs; payment records
Governance	Transparent decisions, member participation and accountability	Meeting records; financial statements; member feedback; documented sales and procurement
Cooperative growth	Track multidimensional performance over successive cycles	Production, sales, profitability, assets, employment, competitiveness and income indicators

The framework is intended as a practical translation of the study's findings. The study did not test the effectiveness of these proposed actions, so the indicators should be used to

monitor implementation and outcomes rather than presented as validated causal measures. To support comparison, cooperatives would need to record data consistently and distinguish changes in the cooperative's own performance from changes in the wider production or market environment.

7. Contribution, Limitations and Future Research

7.1 Contribution to knowledge

The study contributes by examining cooperative-level growth rather than focusing exclusively on farm yield, household income, adoption or market participation. It operationalises growth across several performance dimensions and evaluates four resource-related determinants in a common quantitative framework. The combination of Pearson correlation and multiple regression distinguishes simple association from independent contribution. This distinction is particularly visible in the findings for technology adoption, which correlated positively with growth but did not retain a significant independent coefficient, and financial access, which was non-significant in both analyses. The results also identify governance as an important contextual correlate and predictor within the model.

The study further contributes a district-specific case from Kawambwa. While literature from other countries and regions helps frame plausible mechanisms, local quantitative evidence is needed because infrastructure, market relationships, agricultural support arrangements and cooperative capabilities differ across settings. The findings are not statistically representative of all Zambian cooperatives, but they provide a documented basis for comparison with future studies in other districts and value chains.

7.2 Limitations of inference

Several limitations should guide interpretation. First, the cross-sectional design captures relationships at one period and cannot determine whether changes in resource access preceded changes in cooperative growth. Second, the constructs are based on self-reported perceptions, which may differ from audited records of output, revenue, assets or employment. Third, the sample is confined to 96 respondents associated with 40 maize agribusiness cooperatives in Kawambwa District. The findings should not be generalised automatically to other districts, crops or cooperative types. Fourth, the constructs are related to one another, so the independent coefficients describe conditional associations within the specified model and do not represent the total value of each resource in every practical circumstance.

Fifth, the Breusch–Pagan test indicated heteroscedasticity. The reported HC3 estimates retained the substantive significance pattern for input access, market access and governance, while finance and technology remained non-significant. This robustness check improves confidence in the stated statistical pattern but does not eliminate all uncertainty about model specification or measurement. Finally, the thesis reports a supplementary governance interaction analysis, but the article does not make detailed claims about interaction effects beyond what is supported in the thesis results. The central interpretation remains based on the primary regression model.

7.3 Future research directions

Future studies could follow the same cooperatives across several production and marketing seasons and combine perception measures with administrative or financial records. This would allow researchers to assess changes in sales volumes, profitability, assets, membership, employment and other growth dimensions over time. Replication in other districts would help establish whether the relative significance of input access and market access is specific to Kawambwa or appears in other local contexts. Comparative research could also examine whether differences in governance practices, value-chain orientation or cooperative size alter the relationships observed in this study.

Further work could disaggregate financial access into availability, affordability, adequacy, timing and productive use, and distinguish technology awareness, access, adoption intensity and sustained utilisation. Market access could be assessed through buyer diversity, sales channels, transport costs, prices and payment reliability. Such measures may clarify why a construct can have a positive bivariate association but a non-significant independent coefficient. Any additional variables or interaction terms should be specified before analysis and supported by an adequate sample size. These directions extend the thesis's stated research gaps without changing the four approved objectives of the present study.

7.4 Final synthesis

The evidence from Kawambwa points to the importance of an integrated resource-and-capability approach to maize cooperative growth. Agricultural-input access and market access were significant independent contributors, while financial access and technology adoption did not show statistically significant unique contributions in the full model. Governance was strongly associated with growth and made the largest standardised contribution. These results support coordinated cooperative strategies that link production requirements with commercial opportunities and organisational management. The article's claims remain bounded to the observed cross-sectional relationships, and further longitudinal and comparative research is required to determine whether the same pattern persists over time and across other settings.

Objective / determinant	Pearson r (p)	Standardised β (p)	Evidence-based conclusion
Input access	.663 (< .001)	.195 (.021)	Positive association and significant independent contribution
Financial access	.180 (.079)	.004 (.948)	No statistically significant relationship established at .05 in the reported analyses
Technology adoption	.547 (< .001)	.056 (.495)	Positive bivariate association; independent contribution not established
Market access	.706 (< .001)	.295 (.001)	Strong positive association and significant independent contribution

8. Discussion

8.1 Agricultural-input access and cooperative growth

The first objective examined the relationship between agricultural-input access and cooperative growth. The positive correlation ($r = .663$, $p < .001$) and significant independent coefficient ($\beta = .195$, $p = .021$) indicate that input access was associated with stronger growth both before and after accounting for the other determinants and governance. This result supports the view that access to seed, fertiliser and other productive inputs is a foundational condition for maize agribusiness. The item-level results, however, suggest that effective access is uneven: affordability and fertiliser accessibility had relatively low means, while respondents more strongly acknowledged the negative implications of input shortages for growth.

The finding aligns with Zambian evidence that cooperative-affiliated households use more hybrid maize seed and fertiliser and achieve higher yields [5]. It is also consistent with wider research showing that access, affordability, information and timing influence adoption of improved maize technologies [10-13]. The present study extends that evidence by showing a statistically significant relationship with cooperative-level growth, rather than only household input use or yield. From the RBV perspective, inputs constitute a productive resource whose value is reflected in output and commercial potential when acquired and utilised effectively.

The result does not imply that distributing inputs alone guarantees growth. The questionnaire responses and theoretical framework indicate that affordability, timeliness, quality and organisational coordination matter. Cooperatives may therefore benefit from seasonal input planning, collective procurement, transparent distribution and coordination with financing and market plans. Such measures follow from the observed association but should be evaluated over successive production cycles before long-term effects are claimed.

8.2 Financial access and cooperative growth

The second objective examined financial access. Although this construct had the highest mean among the four focal determinants, its correlation with growth was positive but not statistically significant ($r = .180$, $p = .079$), and its adjusted contribution was very small and non-significant ($\beta = .004$, $p = .948$). This result is important because it distinguishes perceived access from evidence of an independent relationship with cooperative growth. Respondents may report the availability of credit facilities or financial services, yet the available services may not be sufficiently aligned with seasonal cash flow, investment requirements or commercial opportunities to produce measurable differences in growth.

The result does not demonstrate that finance is unimportant. Instead, it indicates that this dataset does not establish a statistically significant independent contribution once input access, technology, market access and governance are considered. Finance may operate through, or overlap with, other resource pathways. For example, funds may be useful for inputs or transport, but their value depends on whether procurement is timely and output can be sold profitably. This interpretation is consistent with the literature's distinction between nominal availability and effective, productive financial access [9, 15-17].

The practical implication is to focus on the suitability and productive use of finance rather than simply increasing the number of credit opportunities. Financial products that fit agricultural cash-flow cycles, realistic loan sizes and operating requirements may be more relevant than generic credit access. Cooperative bookkeeping, budgeting, savings mobilisation and transparent financial management may also help members make better use of funds. These are implications for practice, not effects directly tested by the regression model.

8.3 Technology adoption and cooperative growth

The third objective assessed technology adoption. The bivariate relationship was positive and statistically significant ($r = .547$, $p < .001$), but the independent coefficient was not significant ($\beta = .056$, $p = .495$). This difference between correlation and regression is substantively meaningful. Technology adoption may be associated with growth when considered alone, but its unique contribution is not established after accounting for the other resource factors and governance. The moderate correlations between technology and market access ($r = .621$), input access ($r = .504$) and governance ($r = .504$) indicate that these conditions often vary together in the sample.

The result is compatible with evidence that cooperative membership can increase and accelerate technology adoption in Zambia [6]. However, adoption is not identical to successful utilisation, and technology use may depend on complementary inputs, finance, skills, maintenance and market requirements. The item means also show variation: mechanised equipment and storage technologies were rated more favourably than the widespread adoption of improved maize varieties. These differences caution against treating technology as a single uniform intervention.

The practical interpretation is that technology support should be planned as part of an integrated cooperative business model. Equipment acquisition should be accompanied by training, maintenance arrangements, realistic operating budgets and a clear assessment of whether the technology meets production or marketing needs. Since the study did not establish a unique independent contribution for technology adoption, it would be inappropriate to claim that technology alone predicts cooperative growth in this sample.

8.4 Market access and cooperative growth

The fourth objective examined market access. The construct had the strongest bivariate relationship with cooperative growth among the four focal determinants ($r = .706$, $p < .001$) and retained a significant independent contribution in the full model ($\beta = .295$, $p = .001$). The HC3 estimate also remained significant ($p = .002$). This pattern provides consistent evidence that market access is an important correlate and independent predictor of cooperative growth in the Kawambwa sample. It suggests that the ability to reach buyers, obtain information, coordinate transport and sell output under viable conditions is closely connected to cooperative performance.

The finding is consistent with Zambian studies on maize-market transaction costs and participation [7], seasonal market participation [19], and marketing linkages [21]. It also aligns with research on cooperative market access and output-market interventions [20, 22, 23]. The current result extends these perspectives by using multidimensional

cooperative growth as the outcome and by considering market access simultaneously with input access, finance, technology and governance.

Within the RBV, market access is a commercial capability through which productive resources are converted into revenue and organisational returns. Inputs, finance and technology may raise productive capacity, but sustainable growth requires an outlet for the output. Increased production without reliable buyers, storage, transport and market information can expose cooperatives to price risk, post-harvest losses or distress sales. Collective aggregation, diversified buyer relationships, price comparison, transparent sales procedures and coordinated transport are therefore reasonable practice priorities consistent with the findings.

8.5 Integrated interpretation and governance

Taken together, the results show why the determinants should not be treated as isolated inputs. Input access and market access retained significant independent contributions, while finance and technology did not. This does not mean the latter are irrelevant; rather, their unique contributions were not statistically distinguishable from zero in the specified model. Their benefits may depend on how they complement production, marketing and governance. The model's R^2 of .683 indicates substantial explanatory value within the sample, but approximately 31.7% of observed variation remained unexplained by the included predictors.

Governance had the strongest standardised coefficient (β = .414, $p < .001$) and the strongest bivariate correlation with growth ($r = .761$, $p < .001$). Although governance was not a substantive objective, its contribution supports the argument that resources must be coordinated through organisational capabilities. Leadership, participation, accountability, training and resource mobilisation may affect how input procurement, finance, technology and marketing are planned and implemented. Because the data are cross-sectional and perception-based, this result should be understood as an association rather than proof that governance alone causes growth.

The findings support the RBV in a qualified way. They show that the four focal resource-related factors do not have equal independent contributions within the model, and that organisational governance is strongly associated with growth. This reinforces the need to consider resource access together with the capacity to deploy resources effectively. It also supports differentiated interventions: timely input access and market linkages deserve immediate attention, while finance and technology programmes should be connected to clearly specified productive and commercial uses.

9. Conclusion and Recommendations

9.1 Conclusion

The study investigated four determinants of cooperative growth in maize agribusiness in Kawambwa District: agricultural-input access, financial access, technology adoption and market access. Using questionnaire data from 96 respondents representing 40 cooperatives, it combined descriptive analysis, Pearson correlations and multiple regression. The overall model was statistically significant and explained 68.3% of the observed variance in cooperative growth. This provides district-specific evidence that the selected resource-related determinants and governance, considered together, have explanatory value for differences in perceived cooperative growth.

Agricultural-input access was positively associated with cooperative growth and retained a significant independent contribution. Market access showed the strongest bivariate relationship among the four focal determinants and also remained significant in the regression model. Financial access was positive but non-significant in both correlation and regression analysis at the .05 level. Technology adoption was positively correlated with growth but did not retain a significant independent contribution after adjustment. Governance had the strongest standardised independent contribution in the primary model. The findings indicate that cooperative growth is better understood through the combination and deployment of productive resources and organisational capabilities than through access to any single resource in isolation.

The conclusions are limited to relationships observed within the cross-sectional Kawambwa case. They should not be interpreted as definitive causal estimates or as statistically representative of every maize agribusiness cooperative in Zambia. Nevertheless, the findings provide a useful empirical basis for local cooperative planning, support programming and future research.

9.2 Recommendations

1) Agricultural-input access. Cooperative management, agricultural-support institutions and input suppliers should strengthen seasonal input planning and collective procurement so that quality seed, fertiliser and other essential inputs are available in adequate quantities before planting. Arrangements should prioritise affordability, timely delivery, quality assurance and transparent distribution among members. These priorities follow from the positive independent relationship observed for input access.

2) Financial access. Financial institutions and cooperative-support agencies should emphasise productive, appropriately timed finance rather than nominal availability alone. Financing products should align with seasonal cash flows and realistic uses such as input procurement, aggregation, storage and transport. Cooperatives should strengthen bookkeeping, budgeting, savings mobilisation and cash-flow planning. These recommendations are intended to improve the productive fit of finance; the present model did not establish a significant independent contribution for financial access.

3) Technology adoption. Technology interventions should prioritise appropriate technologies, user training, maintenance and integration with inputs, finance and markets rather than focusing only on equipment acquisition. Cooperative leaders should identify trained operators, budget for recurrent costs and monitor utilisation and productivity outcomes. The non-significant adjusted coefficient indicates that technology adoption should not be treated as a stand-alone growth strategy on the evidence of this study.

4) Market access. Cooperatives should strengthen collective marketing through diversified buyer relationships, regular market-information collection, price comparison, coordinated transport, storage planning and transparent sales and payment procedures. Seasonal marketing plans should identify expected volumes, potential buyers, quality

requirements, transport arrangements and financing needs. District stakeholders can facilitate linkages between cooperatives and millers, traders, institutional buyers and other value-chain actors. This recommendation is supported by the significant independent market-access relationship.

5) Cooperative governance. Cooperative leadership should strengthen transparency, accountability, member participation, record keeping, training and resource mobilisation. These practices should support the implementation of input, finance, technology and market strategies rather than substitute for them. Governance's strong association and largest standardised coefficient make organisational capability a cross-cutting priority, although the cross-sectional design does not establish causality.

6) Coordinated implementation and monitoring. Cooperative management and members, the Ministry of Agriculture and other relevant government institutions, financial institutions, input suppliers, development partners, local authorities and market actors should coordinate interventions. Immediate priorities should include timely input procurement and stronger market linkages. Financial and technology interventions should be integrated with these priorities and assessed according to productive use and contribution to cooperative performance, rather than by access or acquisition alone. Future assessments should track changes across multiple production and marketing cycles to distinguish short-term perceptions from sustained organisational growth.

9.3 Future research

Further research could use longitudinal data across several production and marketing cycles to examine whether the observed relationships persist over time. Studies in other districts could assess the transferability of the Kawambwa findings. Future work could also investigate the mechanisms through which finance and technology contribute to growth, including whether their effects depend on governance, market access or input availability. Such extensions should retain a clear distinction between association and causation and should use measures that capture both resource access and actual productive use.

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