

Determinants of Moringa Marketing-Channel Choice Among Smallholder Value-Chain Actors in Semi-Arid Makueni County, Kenya

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ABSTRACT

Marketing-channel choice is an important component of agricultural commercialization because alternative channels differ in price incentives, transaction costs, market accessibility, buyer reliability and volume requirements. This study examined the factors influencing Moringa marketing-channel choice among value-chain actors in Kibwezi East and West Sub-Counties of Makueni County, Kenya. Primary data were collected using structured questionnaires from 650 Moringa value-chain actors comprising producers, middlemen or brokers, retailers, wholesalers, processors and consumers. Descriptive statistics and binary logistic regression were used to analyse the determinants of marketing-channel choice. Eight explanatory variables were included in the final model: price received, distance to market, quantity marketed, trust in the buyer, transport accessibility, education level, farming experience and land allocated to Moringa. The logistic regression model was statistically significant (Model $\chi^2 = 124.83$, $p < 0.001$), with a Cox and Snell R^2 of 0.39 and Nagelkerke R^2 of 0.47. The model correctly classified 76.9% of observations, while the Hosmer–Lemeshow goodness-of-fit test was non-significant ($p = 0.624$), indicating an adequate model fit. Price received was positively associated with marketing-channel choice ($\beta = 0.021$, OR = 1.021, $p < 0.001$), while distance to market had a negative association ($\beta = -0.087$, OR = 0.917, $p < 0.001$). Quantity marketed ($\beta = 0.014$, OR = 1.014, $p < 0.001$), trust in buyers ($\beta = 0.563$, OR = 1.756, $p < 0.001$), transport accessibility ($\beta = 0.431$, OR = 1.539, $p < 0.001$), and land allocated to Moringa ($\beta = 0.392$, OR = 1.480, $p = 0.001$) were also positively associated with channel choice. Education and farming experience were not statistically significant. The findings demonstrate that Moringa marketing-channel decisions are shaped primarily by economic incentives, transaction costs, market accessibility, relational governance and production capacity rather than formal education or farming experience. Strengthening market information systems, transport infrastructure, aggregation arrangements, producer–buyer relationships and production capacity could expand smallholder access to more attractive and reliable Moringa marketing channels in semi-arid Kenya.

Keywords: Moringa, marketing-channel choice, value chain, smallholders, market access, transaction costs, logistic regression, semi-arid Kenya

INTRODUCTION

Agricultural commercialization is increasingly recognized as an important pathway through which smallholder producers can improve household incomes, diversify livelihoods and participate more effectively in expanding food and non-food markets. However, production alone does not guarantee commercial benefits. The marketing channel through which agricultural products move from producers to consumers determines the

prices received, transaction costs incurred, market information available and relationships established among value-chain actors. Consequently, understanding the factors that influence marketing-channel choice is important for designing interventions that improve smallholder participation in agricultural markets.

Marketing channels differ in their organizational arrangements, transaction requirements and economic outcomes. Producers may sell directly to consumers, traders or brokers, while other channels involve wholesalers, processors, retailers or organized buyers. The selection of one channel over another may depend on expected prices, transaction costs, market distance, available quantities, buyer reliability and access to transportation. Value-chain analysis emphasizes that these relationships determine how products, information and value move among actors and how different participants access commercial opportunities (Kaplinsky & Morris, 2002; Gereffi et al., 2005).

The importance of marketing-channel choice is particularly pronounced in semi-arid agricultural systems. Producers in such environments commonly operate within fragmented markets and may face infrastructure constraints, variable production conditions, limited market information and high transaction costs. Physical distance from markets and the cost of transportation can restrict access to buyers offering relatively attractive prices. Similarly, small quantities of produce may limit the ability of individual farmers to meet the requirements of processors, wholesalers or institutional buyers.

Moringa is increasingly recognized as a multipurpose crop with potential to contribute to food security, nutrition and livelihood diversification. Moringa products include fresh and dried leaves, leaf powder, seeds, pods and seed oil. The crop has attracted interest because different plant components can be used for food, nutritional, cosmetic and other commercial purposes (Gopalakrishnan et al., 2016). In Kenya and Ethiopia, however, Moringa growers continue to face constraints related to market access, production inputs, information and commercialization (Kumssa et al., 2017).

In Makueni County, Moringa production and marketing occur within a semi-arid environment characterized by spatially dispersed producers and heterogeneous market opportunities. Kibwezi East and West Sub-Counties contain several Moringa-producing communities, including Makindu, Emali, Masongaleni and Thange. Value-chain actors operate through different marketing arrangements, but evidence on the factors that determine their choice among alternative channels remains limited.

Existing agricultural marketing studies frequently emphasize price, transaction costs and infrastructure, while relational factors such as trust and production capacity may receive less attention. In the Moringa value chain, these factors may interact. A producer may prefer a buyer offering a high price, but the channel may become unattractive if the buyer is located far away or if transportation is expensive. Similarly, a producer with limited output may be unable to access a buyer requiring large and consistent volumes. Trust may also influence whether actors are willing to maintain repeated relationships with particular buyers.

The present study therefore contributes empirical evidence on the determinants of Moringa marketing-channel choice among value-chain actors in semi-arid Kenya. The analysis combines economic, spatial, relational and production-related variables within a binary logistic regression framework.

The study addressed the following research question:

What factors significantly influence marketing-channel choice among Moringa value-chain actors in Kibwezi East and West Sub-Counties of Makueni County, Kenya?

The specific objective was:

To determine the major factors influencing marketing-channel choice in the Moringa product value chain in Kibwezi East and West Sub-Counties, Makueni County, Kenya.

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Agricultural Marketing-Channel Choice

Marketing-channel choice refers to the decision by producers and other value-chain actors concerning the outlet through which agricultural products are exchanged. Channel alternatives may differ in price, transaction costs, accessibility, information requirements, quality standards and buyer relationships. Smallholder producers commonly choose channels that provide an acceptable combination of expected returns, accessibility and transaction reliability. Value-chain approaches emphasize that markets are not simply mechanisms for exchanging commodities but systems involving relationships, governance, information and coordination among actors. Gereffi et al. (2005) demonstrate that governance structures influence how transactions are coordinated across value chains. In smallholder agricultural systems, the availability of reliable buyers and appropriate coordination mechanisms can therefore influence the channels through which products are marketed.

Transaction Costs and Marketing Decisions

Transaction Cost Economics provides an important explanation for marketing-channel choice. Williamson (1985) argues that market exchanges involve costs associated with searching for information, negotiating, monitoring, enforcing agreements and managing uncertainty. In agricultural markets, transaction costs may include transportation, searching for buyers, obtaining price information and dealing with uncertain payment arrangements. Distance to market is particularly relevant because greater distance can increase transportation and time costs. Conversely, improved transport accessibility can make otherwise distant markets economically viable. From this perspective, actors are expected to favour channels that provide acceptable returns while reducing transaction costs and uncertainty.

Random Utility Theory and Channel Choice

Random Utility Theory provides a complementary framework for understanding discrete marketing decisions. McFadden (1974) conceptualizes choice as a comparison of the utility associated with alternative options. An actor selects the alternative that provides the highest perceived utility, subject to observable and unobservable characteristics. Applied to agricultural marketing, a channel's utility may depend on price, accessibility, transaction costs, buyer reliability and the quantity an actor is capable of supplying. Thus, marketing-channel choice can be viewed as the outcome of comparing the expected benefits and costs associated with alternative channels.

Price Incentives

Price is one of the most direct economic incentives affecting marketing decisions. Producers have an incentive to select outlets offering relatively attractive prices, provided that the additional costs of accessing those outlets do not eliminate the price advantage. Price information can therefore influence both channel selection and the willingness of producers to establish relationships with particular buyers. However, price should not be considered independently of transaction costs. A high price at a distant market may provide little additional benefit if transport and other marketing costs are sufficiently high. Consequently, the effective attractiveness of a marketing channel reflects the interaction between expected price and the costs associated with accessing the channel.

Production Capacity and Market Access

The quantity available for sale can affect the set of marketing channels accessible to a producer. Larger volumes may enable actors to meet buyer requirements and spread transportation or transaction costs across more units. Smallholder producers with limited quantities may instead depend on local traders or brokers who collect output from dispersed farms. Land allocation to Moringa may therefore be indirectly related to channel choice through production capacity. Producers with larger areas under Moringa may have greater quantities available for sale and may be better positioned to engage processors, wholesalers and other bulk buyers.

Trust and Relational Governance

Trust is another important element of agricultural marketing. Transactions can involve uncertainty concerning prices, weights, quality, payment and delivery. Where buyers and sellers develop reliable relationships, some of these uncertainties may be reduced. Trust may therefore lower perceived transaction risks and facilitate repeated exchange. This is consistent with value-chain governance perspectives, which recognize that coordination among actors can occur through relationships as well as formal contractual arrangements (Gereffi et al., 2005).

Research Gap

Although previous studies have examined agricultural market participation, relatively limited empirical attention has been given to the determinants of Moringa marketing-channel choice in semi-arid Kenya. In particular, there is a need to examine economic incentives together with spatial accessibility, transport, production capacity and relational factors. This study addresses this gap by estimating a multivariable binary logistic regression model using data from Moringa value-chain actors in four wards of Kibwezi East and West Sub-Counties. The approach allows the relative contribution of economic, spatial, production and institutional factors to be examined simultaneously.

Conceptual Framework

The conceptual framework assumes that marketing-channel choice is influenced by four broad categories of factors.

Economic factors include price received and quantity marketed.

Spatial and infrastructural factors include distance to market and transport accessibility.

Relational factors include trust in buyers.

Production-capacity factors include land allocated to Moringa.

Education and farming experience were included as individual characteristics.

These factors were expected to influence the perceived utility and transaction costs associated with alternative marketing channels and, consequently, the likelihood of selecting the modeled preferred or higher-value channel.

Conceptual relationship

Economic factors

Price received

Quantity marketed



Spatial/infrastructure factors

Distance to market

Transport accessibility



Relational factors

Trust in buyer



Production capacity

Land under Moringa



Individual characteristics

Education

Farming experience



Marketing-channel choice

The framework is grounded in the combined logic of Transaction Cost Economics and Random Utility Theory. Transaction costs influence the relative attractiveness of channels, while actors select alternatives according to their expected utility.

MATERIALS AND METHODS

Study Area

The study was conducted in Kibwezi East and Kibwezi West Sub-Counties of Makueni County, Kenya. Four wards—Makindu, Emali, Masongaleni and Thange—were selected as the principal study locations. The area is characterized by semi-arid conditions and diversified smallholder agricultural production. Moringa production in the study area involves smallholder households and other value-chain actors who participate in production, aggregation, processing and marketing. The spatial distribution of producers and markets provides an appropriate setting for examining the influence of market accessibility and transaction costs on marketing-channel choice.

Research Design and Study Population

A cross-sectional descriptive survey design was used. The study population comprised Moringa value-chain actors involved in production, trading, processing and consumption. The final sample comprised 650 respondents distributed among producers, middlemen or brokers, retailers, wholesalers, processors and consumers. Producers accounted for 167 respondents (25.7%), middlemen or brokers 90 (13.8%), retailers 108 (16.6%), wholesalers 63 (9.7%), processors 12 (1.8%) and consumers 210 (32.3%).

Based on the study wards, Makindu accounted for 275 respondents (42.3%), Emali 160 (24.6%), Masongaleni 105 (16.2%) and Thange 110 (16.9%).

Sampling Procedure

A multistage sampling procedure was applied to identify Moringa-producing locations and value-chain actors. The selected wards were used as the principal spatial units, after which relevant Moringa value-chain actors were identified and sampled. The sampling approach was designed to capture variation among different categories of actors and locations within the Moringa value chain.

Data Collection

Primary data were collected using structured questionnaires. The questionnaire covered socio-economic characteristics, marketing practices, products handled, market locations, prices received, transaction volumes, transportation, market access and buyer relationships. Structured questionnaires facilitated standardized data collection and comparison among respondents (Creswell & Creswell, 2018; Dillman et al., 2014).

Variables and Measurement

The dependent variable represented marketing-channel choice. The final thesis analysis used a binary logistic regression framework to estimate the likelihood of the modeled marketing-channel outcome.

Eight explanatory variables were included:

1. Price received (KES/kg)
2. Distance to market (km)
3. Quantity marketed (kg)
4. Trust in buyer, measured on a 1–5 scale
5. Transport accessibility, measured on a 1–5 scale

6. Education level (years)
7. Farming experience (years)
8. Land under Moringa cultivation

The direction of association was evaluated using estimated logistic regression coefficients and odds ratios.

Analytical Model

Binary logistic regression was employed because the dependent variable represented a binary marketing-channel outcome. The model was specified as:

$$\ln(P_i / (1 - P_i)) = \beta_0 + \beta_1 \text{PRICE}_i + \beta_2 \text{DIST}_i + \beta_3 \text{QUANT}_i + \beta_4 \text{TRUST}_i + \beta_5 \text{TRANSP}_i + \beta_6 \text{EDU}_i + \beta_7 \text{EXP}_i + \beta_8 \text{LAND}_i + \varepsilon_i$$

where:

- P_i is the probability that actor i selects the modeled marketing-channel outcome;
- $1 - P_i$ is the probability of the alternative outcome;
- PRICE is price received;
- DIST is distance to market;
- QUANT is quantity marketed;
- TRUST is trust in buyer;
- TRANSP is transport accessibility;
- EDU is education level;
- EXP is farming experience; and
- LAND is land allocated to Moringa.

The coefficients were estimated using maximum likelihood procedures.

Statistical Inference and Model Evaluation

Wald statistics were used to assess the statistical significance of individual coefficients. Statistical significance was evaluated at the 5% level.

Overall model significance was assessed using the likelihood-ratio chi-square statistic. Model explanatory strength was assessed using Cox and Snell and Nagelkerke pseudo- R^2 statistics. Predictive performance was assessed using the percentage of correctly classified cases, while model fit was assessed using the Hosmer–Lemeshow goodness-of-fit test.

Data were processed and analysed using SPSS version 26.

Ethical Considerations

Participation was voluntary and respondents were informed about the purpose of the research. Appropriate consent procedures were followed. Information collected from respondents was treated confidentially and used for research purposes.

RESULTS

Characteristics of the Moringa Marketing System

The Moringa marketing system in the study area involved several categories of actors, including producers, middlemen or brokers, retailers, wholesalers, processors and consumers. The diversity of actors indicates that Moringa products move through multiple marketing arrangements rather than a single standardized channel.

The participation of brokers, retailers and processors varied across the study wards, indicating spatial differences in the organization of Moringa markets. These differences provide an important context for understanding marketing-channel choice.

Production Characteristics Relevant to Marketing

Moringa production was predominantly undertaken by smallholder households. The average landholding was approximately 2.23 ha, while average cultivated land was approximately 1.74 ha after conversion from the original acre-based measurements.

The average land allocated to Moringa in the underlying thesis dataset was approximately 0.43 ha. Production characteristics varied across wards, with Masongaleni generally recording larger areas under Moringa than the other study wards.

These production differences are relevant because the quantity available for marketing may determine the ability of actors to access buyers requiring larger or more consistent supplies.

Determinants of Marketing-Channel Choice

The binary logistic regression model was statistically significant:

Model $\chi^2 = 124.83$, $p < 0.001$.

The model had a Cox and Snell R^2 of 0.39 and a Nagelkerke R^2 of 0.47. These pseudo- R^2 values indicate substantial explanatory strength for a binary choice model but should not be interpreted as equivalent to the percentage of ordinary linear-regression variance explained.

The model correctly classified 76.9% of observations. The Hosmer–Lemeshow goodness-of-fit test was non-significant ($p = 0.624$), indicating no statistically significant evidence of poor model fit.

Table 1. Determinants of Moringa marketing-channel choice

Predictor	β	SE	Wald χ^2	Odds Ratio	p-value
Price received (KES/kg)	0.021	0.005	17.64	1.021	<0.001***
Distance to market (km)	−0.087	0.024	13.15	0.917	<0.001***
Quantity marketed (kg)	0.014	0.003	21.82	1.014	<0.001***
Trust in buyer (1–5)	0.563	0.137	16.89	1.756	<0.001***
Transport accessibility (1–5)	0.431	0.122	12.49	1.539	<0.001***
Education level (years)	0.047	0.028	2.81	1.048	0.094
Farming experience (years)	0.018	0.013	1.92	1.018	0.166
Land under Moringa (original model: acres)	0.392	0.118	11.05	1.480	0.001**
Constant	−3.216	0.845	14.49	—	<0.001

Note: *** $p < 0.001$; ** $p < 0.01$. The land-under-Moringa variable in the original regression was recorded in acres; its coefficient and odds ratio are retained in the original scale to preserve consistency with the estimated thesis model. Descriptive land-area statistics elsewhere in the article are presented in hectares.

The results show that six of the eight explanatory variables were statistically significant: price received, distance to market, quantity marketed, trust in buyer, transport accessibility and land under Moringa. Education and farming experience were not statistically significant.

Price Received

Price received had a positive and statistically significant association with marketing-channel choice ($\beta = 0.021$, OR = 1.021, $p < 0.001$). The odds ratio indicates that a one-unit increase in price received was associated with approximately a 2.1% increase in the odds of the modeled marketing-channel outcome, holding the other variables constant.

Distance to Market

Distance to market was negatively associated with marketing-channel choice ($\beta = -0.087$, OR = 0.917, $p < 0.001$). The odds ratio indicates that an additional kilometre of market distance was associated with approximately an 8.3% reduction in the odds of the modeled marketing-channel outcome, *ceteris paribus*.

Quantity Marketed

Quantity marketed was positively and significantly associated with channel choice ($\beta = 0.014$, OR = 1.014, $p < 0.001$). Actors marketing larger quantities had greater odds of selecting the modeled marketing-channel outcome.

Trust in Buyer

Trust in the buyer had a strong positive association with channel choice ($\beta = 0.563$, OR = 1.756, $p < 0.001$). A one-point increase in the trust score was associated with approximately a 75.6% increase in the odds of the modeled marketing-channel outcome, holding other predictors constant.

Transport Accessibility

Transport accessibility was positively associated with channel choice ($\beta = 0.431$, OR = 1.539, $p < 0.001$). A one-point increase in the transport-accessibility score was associated with approximately a 53.9% increase in the odds of the modeled marketing-channel outcome.

Land under Moringa

Land allocated to Moringa was positively associated with channel choice ($\beta = 0.392$, OR = 1.480, $p = 0.001$). The original regression variable was measured in acres. The result indicates that greater production area was associated with higher odds of the modeled marketing-channel outcome.

Education and Farming Experience

Education level was not statistically significant at the 5% level ($\beta = 0.047$, OR = 1.048, $p = 0.094$). Farming experience was also not statistically significant ($\beta = 0.018$, OR = 1.018, $p = 0.166$).

DISCUSSION

Price Incentives and Marketing-Channel Choice

The positive association between price and channel choice confirms the importance of economic incentives in Moringa marketing decisions. Actors have an incentive to select channels that offer attractive returns, provided that the additional costs of accessing those channels remain manageable.

This finding is consistent with value-chain theory, which emphasizes that the distribution of value and the terms of exchange influence the behaviour of value-chain actors (Kaplinsky & Morris, 2002). The result also

supports the utility-based interpretation of channel selection: a channel offering a more attractive expected price provides greater economic utility, all else being equal.

However, the significance of distance and transport accessibility demonstrates that price cannot be considered independently from transaction costs. A high-price market may not be attractive if it requires substantial expenditure to reach it.

Market Distance and Transaction Costs

The negative relationship between market distance and channel choice demonstrates the importance of spatial accessibility. Additional distance can increase transport expenditure, travel time and uncertainty while reducing the attractiveness of distant markets.

This result is consistent with Transaction Cost Economics, under which actors consider not only the price obtained from an exchange but also the costs of organizing and completing the transaction (Williamson, 1985). Geographic distance can increase several components of transaction costs and consequently reduce the feasibility of particular channels.

The finding is especially relevant to semi-arid smallholder systems where rural infrastructure may be inadequate and producers are spatially dispersed. Improving rural connectivity and establishing local aggregation points could therefore expand the range of markets accessible to Moringa producers.

Quantity Marketed and Commercial Channel Access

The positive relationship between quantity marketed and channel choice indicates that volume is important in determining access to commercial markets. Buyers such as processors and wholesalers may require consistent quantities that individual smallholders cannot always supply.

Larger marketed volumes may also reduce average transaction costs because transportation and other marketing expenses can be distributed over more units. This provides an economic explanation for why actors handling larger quantities may have greater access to commercial channels.

The finding supports the importance of producer aggregation. Producer groups can combine output, coordinate transportation and improve the reliability of supply. Such arrangements can help overcome scale constraints commonly faced by smallholders.

Trust and Relational Governance

Trust was among the strongest statistically significant predictors in the model. The positive relationship indicates that actors with stronger buyer relationships were more likely to participate in the modeled marketing-channel outcome.

This result is consistent with Transaction Cost Economics because trust can reduce uncertainty and the resources required to monitor or search for alternative buyers. It is also consistent with value-chain governance theory, where repeated relationships can facilitate coordination and information exchange (Gereffi et al., 2005).

For Moringa markets, trust may be especially important because transactions may involve informal arrangements concerning prices, product quality, quantities and payment. Reliable buyer relationships can therefore reduce perceived risk and encourage repeated participation.

Transport Accessibility

The positive effect of transport accessibility reinforces the importance of infrastructure and logistics. Better transport conditions can lower the effective cost of reaching markets and enable actors to respond to market opportunities that would otherwise be inaccessible.

The combined significance of distance and transport accessibility is particularly informative. Distance represents the spatial separation between production and markets, while transport accessibility determines the extent to which that separation can be overcome. Thus, improving transport systems may increase the number of economically viable channels available to smallholders.

Land under Moringa and Production Capacity

The positive association between land under Moringa and marketing-channel choice suggests that production capacity influences commercial opportunities. Actors with larger areas under Moringa may have greater ability to generate quantities required by bulk buyers.

The finding should nevertheless be interpreted as an association rather than proof that increasing land allocation causes movement into a particular channel. Land allocation may also be associated with other factors such as capital, labour availability, entrepreneurial orientation and access to inputs.

The significance of both land under Moringa and quantity marketed nevertheless provides a coherent indication that production scale is relevant to channel participation.

Education and Farming Experience

Education and farming experience were not statistically significant predictors. This suggests that formal schooling and years of farming experience alone may not determine access to alternative Moringa marketing channels.

The result implies that structural and market-related constraints may be more important than individual characteristics. A highly educated or experienced producer may still be constrained by poor roads, inadequate transport, limited quantities or unreliable buyers.

Marketing interventions should therefore emphasize practical market capabilities rather than assuming that general education or accumulated farming experience automatically improves channel access.

Integrated Interpretation through TCE and Random Utility Theory

The findings provide support for combining Transaction Cost Economics and Random Utility Theory in explaining Moringa marketing-channel choice.

From the TCE perspective, actors seek to reduce the costs and uncertainty associated with transactions. Distance increases transaction costs, while transport accessibility can reduce them. Trust can reduce uncertainty associated with buyer relationships, while larger quantities can make transactions more commercially viable.

From the Random Utility Theory perspective, actors select the marketing alternative that provides the greatest expected utility. Price contributes positively to utility, whereas distance reduces utility. Transport accessibility and trust increase the attractiveness of a channel, while production capacity influences the channels that an actor can realistically access.

The combined framework therefore suggests that marketing-channel choice is neither simply a price decision nor merely a geographical decision. It represents a multidimensional choice involving expected returns, transaction costs, market accessibility, relational reliability and production capacity.

Implications for Moringa Commercialization

The findings suggest that improving Moringa commercialization requires interventions addressing multiple constraints simultaneously. Better market information can improve price discovery, while improved roads and transport can reduce physical barriers. Aggregation can address quantity constraints, while transparent trading arrangements can strengthen trust.

This integrated approach is likely to be more effective than interventions targeting individual constraints in isolation.

CONCLUSIONS

The study demonstrates that Moringa marketing-channel choice in Kibwezi East and West Sub-Counties is influenced by a combination of economic, spatial, relational and production-related factors.

Price received, quantity marketed, trust in buyers, transport accessibility and land allocated to Moringa were positively associated with the modeled marketing-channel outcome, while distance to market was negatively associated with it. Education and farming experience were not statistically significant.

The findings indicate that economic incentives are important, but they operate within a broader market environment shaped by transaction costs, physical accessibility, buyer relationships and production capacity. Consequently, improving marketing-channel participation requires more than providing better prices. Smallholder actors also need affordable transport, accessible markets, reliable buyers, adequate production capacity and mechanisms for aggregating output.

The evidence supports the use of an integrated value-chain approach to Moringa commercialization in semi-arid Kenya.

Policy and Practical Implications

Strengthen Market Information Systems

Timely and reliable information on prevailing Moringa prices, buyer requirements and available markets should be made accessible to producers and other value-chain actors. Improved information can strengthen bargaining capacity and enable actors to compare alternative channels.

Improve Rural Transport and Market Infrastructure

Investment in feeder roads, market access infrastructure and transport services is important because distance and transport accessibility were significant determinants of channel choice.

Establish and Strengthen Aggregation Centres

Local aggregation centres can reduce the burden of transporting small quantities individually and enable producers to combine output for bulk buyers.

Strengthen Producer Organizations

Producer organizations and cooperatives can improve collective marketing, price negotiation, transport coordination, market information and buyer relationships.

Promote Transparent Buyer Relationships

Transparent weighing, grading, pricing and payment procedures should be encouraged. These measures can strengthen trust and reduce transaction uncertainty.

8.6 Link Production Support with Market Development

Support for Moringa production should be linked to identifiable market opportunities. Increasing production without corresponding market arrangements could expose producers to marketing difficulties.

Develop Location-Specific Interventions

Because market accessibility and value-chain organization vary spatially, interventions should consider local

conditions in Makindu, Emali, Masongaleni and Thange rather than applying identical strategies throughout the study area.

LIMITATIONS OF THE STUDY

The study used cross-sectional data and therefore identifies associations rather than causal relationships. Longitudinal research could provide stronger evidence concerning how changes in prices, infrastructure, production and buyer relationships affect channel choice over time.

The binary specification of the dependent variable also simplifies the complexity of agricultural marketing because value-chain actors may use multiple channels simultaneously. Future studies could employ multinomial, nested or mixed logit models where detailed channel-specific data are available.

Trust and transport accessibility were partly based on respondent assessments and may therefore contain subjective elements. Future research could combine perception-based measures with objective indicators such as actual transport costs, travel time and road conditions.

Other potentially relevant factors; including access to credit, market information, producer-organization membership, contractual arrangements, gender, product quality and digital marketing, could also influence channel selection and should be examined in future studies.

Finally, the findings are drawn from four wards in Kibwezi East and West Sub-Counties and should be generalized to other regions with appropriate caution.

Declaration

Ethics Approval and Consent to Participate

The study was conducted in accordance with applicable institutional and ethical requirements. Respondents were informed about the purpose of the research and participated voluntarily following appropriate consent procedures.

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