Smallholder Farmers' Perception Of Sunflower Commercialization: A Case In Kimilili Sub-County, Bungoma County, Kenya

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Abstract
Low-income generation among Smallholder farmers could be attributed to their low sunflower commercialization with subsequent effects from their knowledge, entrepreneurial skills, commercializing efforts, and trust in critical stakeholders in the agricultural value chain. Thus, this study analyzed smallholder farmers' perception of sunflower commercialization, which may contribute to improving sunflower commercialization. A pilot study was carried out in Kabuchai Sub-County before the Kimilili Sub-County, Bungoma County, Kenya survey. 288 sunflower smallholder farmers were interviewed using an open and close-ended questionnaire where a multi-stage sampling procedure was applied. The study used factor analysis and structural equation models to analyze the perception of smallholder farmers on sunflower commercialization. The factor analysis model reflected that smallholder farmers firmly trust agricultural cooperatives, media, and the national government in sunflower commercialization. However, they moderately trusted producer groups, farmer groups, and neighbour farmers. Smallholder sunflower farmers also strongly trusted different market outlets based on Factors 1 and 2. They strongly trusted exporters, producer groups, and neighbor farmers under factor 1 as their market outlets but lowly trusted brokers and supermarkets. Further, they highly trusted brokers and supermarkets under factor 2 as their market outlets and lowly trusted exporters, producer groups, and neighbor farmers as their market outlets. Additionally, smallholder farmers expressed their proactiveness strongly on commercial impact, commercial efficiency, and farmers' view concerns about their sunflower commercialization. They lowly suggested marketing channels contracts, and commercial contributions to their livelihoods to shape their proactiveness on sunflower commercialization. An alpha reliability scale of over 0.79 per measurement variable and a KMO value of over 0.8 was obtained for this study, showing the internal consistency of the data. The SEM analysis showed that smallholder farmers' entrepreneurship, trust in institutions, and market outlets influenced sunflower commercialization. However, their proactiveness negatively affected sunflower commercialization. The study recommends support of sunflower smallholder farmers in access to market information and strengthening their trust through institutions viable outcomes on them through the agricultural cooperatives, the national government, and coordination by the international markets.
Keywords: *Smallholder Farmers' Perception, Sunflower Commercialization, Principal Component Analysis, Rationality and Utility.*

I.   Introduction

Global sunflower production relies on increased demand for oilseeds in the world market and support of weather conditions in producing countries (1). Sunflower is a short, seasoned crop with a high potential to meet human and livestock feed demand (2). The crop accounts for over 87% of vegetable oil, making it an emerging and cost-effective agricultural produce. It is preferable for local and national agribusiness based on its low input cost, short production season, and marginal cropping conditions (3; 4). These sunflower attributes can significantly impact smallholder farmer's income generation and help meet their household demands (5). Further, research studies show smallholder farmers' importance in sustaining rural economies, affecting market forces, and providing platforms for new enterprise development and environmental protection (6). Therefore, to improve rural livelihoods in developing countries, smallholder farmers need to be connected to the market by commercializing sunflower produce, which is a requisite for urban and rural development (5; 6).

Smallholder agriculture commercialization significantly promotes rural households' well-being in generating income (7). Response to sunflower commercialization among smallholder farmers through increased production and supply to the market considering every action at the input and output market signals, strengthening their capacity to access local, national, and regional markets while utilizing farm-level production technologies and integration of processors might increase the level of sunflower commercialization (8). Further, sunflower commercialization goes beyond well-functioning markets and adequate institutional arrangements to efficient, low-cost factors that reflect the opportunity cost for them to choose a utility and profit-maximizing agricultural entity rationally. However, studies show these farmers experiencing low income and struggling with balancing subsistence and commercialization of their agricultural produce; therefore, these farmers need to directly take part in the marketplaces for them to make a rational choice in taking advantage of favourable trading terms rather than being confined by the intermediaries to a single irrational choice. If they directly participate in the market, smallholder farmers can access relevant technologies for their produce, reliable and quality input supply, encounter lower transaction costs, stable market linkages, and social credentials, thus increasing revenue in their sunflower entity (9).

Nevertheless, only a small portion of smallholder farmers have been able to participate in the marketplace (9). Despite surplus produce, these farmers have been constrained by poor price negotiation skills, poor access to marketing information, market scarcity, and extreme post-harvest losses (10), thus poorly competing in the market, allowing intermediary domination and facing bull whip economic effect (11). Additionally, smallholder farmers' transformation of commercialization pathways has been affected by institution voids, poor infrastructure, and low entrepreneurial farming spirit, which inhibit the linking processes of these farmers to markets (12; 13).

The difference in approach toward connecting farm operations and their livelihoods has adversely affected their rate of commercialization (14). An outstanding challenge among smallholders has been their belief in commercialization institutions' allegations to enhance the agricultural markets (15; 16). In essence, smallholder farmers try to increase their agricultural produce in the belief and trust of these marketing institutions (17). Surprisingly, the notion does not stand, especially during peak season, as smallholder farmers source alternatives to utilize their produce. Further, they consider product choices and decisions on which inputs to apply based on utility and profit maximization principles (18). However, this transformation process from subsistence production to full commercialization relies on the complexity of factors constraining each household's decision to engage in sunflower commercialization.

Research has distinct endogenous and external factors impacting smallholder farmers' decisions on commercializing their agricultural produce. Internal factors such as trust in commercialization institutions and market outlets for their produce and households' resources in the financial, social, and physical natural capital endowment are vital to smallholder farmers' participation in sunflower commercialization (19). Additionally, external factors, including agro-climate change, urbanization, population growth, and economic policy dynamism, hampers household decisions, efforts, and their attitude toward commercializing sunflowers, especially when they lack resilience towards these factors (20). Thus, it is necessary to analyze smallholder farmers' link of farm goals and decisions to household needs in consideration of market upheavals, market prices, and input costs. If they resonate, their attitude on sunflower commercialization will enable them to observe components of commercialization programs.

II. Materials And Methods

This study was conducted in the Kimilili sub-county, Bungoma County, Kenya, in April-May 2023. The county experiences bimodal rainfall, with shorter and prolonged rains averaging 1200mm and 1800mm per annum, respectively, and temperatures ranging from 15^0C- 30^0C. The sub-county is on latitude 0.78333 and longitude 34.7167, 0^046' 0" North, 34^043' 0"East with an altitude of 1695m. The sub-county has five wards: Kamukuywa, Maeni, Kimilili Township, Kibingei, and Kimilili Rural. The farmers in the study area engage in mixed farming, producing sunflowers, sugarcane, coffee, and surplus maize for cash cropping. A sample of 288 was obtained using the (21) formula. A multi-stage sampling procedure was applied to the smallholder farmers, and a semi-structured questionnaire was administered. A scale reliability of 0.9228 was obtained within the accepted threshold of 0.7. Data was collected in the Kimilili sub-county, where sociodemographic information was obtained from the sunflower farmers.

Further, respondents evaluated their affirmative based on five Likert scale*: 1 strongly agree, 2 agree, 3 neutral, 4 disagree, and 5 strongly disagree*, relating to their trust in commercialization institutions, existing marketing outlets in the region, entrepreneurial characters, and their proactiveness on sunflower commercialization. The data was analyzed using the principal component analysis model on smallholder farmers' perception of sunflower commercialization. The principal component analysis model is as follows:

Let y = p (number of variables)-dimensional vector comprising variables

$Ey \approx$ 0 and let

$\Omega \approx \mathrm{E}(yy')$ be the covariance matrix of y

Factor analysis assumes a specific multivariate model that suggests a particular structure Ω. Thus, y of the observable variables is considered to relate linearly to a q-dimensional vector η of unobserved (latent variables).

$$\mathrm{Y} \approx \beta\eta + \omega \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (1)$$

where;

$q < p$, β is a (p×q) parameter matrix (factor loadings)

$\omega \approx$ vector of error variables (latent)

$\mathrm{E}\eta$ is assumed to be equal to 0.

To standardize:

$$\mathrm{E}(\eta\eta') \approx 1$$

Further, η they ω are assumed to be uncorrelated.

$$\mathrm{E}(\eta\omega') \approx 0$$

Also, $\beta \approx q$ thus,

$$\Omega \approx \beta\beta' + \Sigma \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (2)$$

This imposes covariance structure restriction on y.

Replacing β with $\beta* \approx \beta\Gamma''$ and simultaneously η $\eta* \approx \mathrm{T}\eta$ by being an orthogonal matrix, then equation (1) and (2) holds true.

β It can be determined to be orthogonal T under relevant restrictions Σ (22).

III. Results And Discussion

Descriptive Statistics of Smallholder Farmers' Perception of Sunflower Commercialization

The study carried out a survey in the field among 288 sunflower farmers who responded positively (100%) to the data collection tools. An average mean of more than one was retained for data analysis. One factor was observed in institution trust, farmer entrepreneurship, farmer proactiveness, and two factors under market outlet trust using the principal factor analysis method. (Table 1).

Table 1: Summary and Descriptive Statistics of data used on the Perception of Smallholder Farmers on Sunflower Commercialization

Variable	Value Label	Variable label	Obser	Mean	SD	Min	Max
producer	trust1	How would you describe your trust in the producer group?	288	3.743	1.167	1	5
Farmer group	trust2	How would you describe your trust in the Farmer group?	288	3.538	1.061	1	5
Community social group	trust3	How would you describe your trust in the community social groups?	288	3.586	1.065	1	5
Extension officers	trust4	How would you describe your trust in the extension officers?	288	3.704	1.075	1	5
Private agents	trusr5	How would you describe your trust in the private agents?	288	3.524	1.135	1	5
Media trust	trust6	How would you describe your trust in the media?	288	3.614	1.104	1	5
Agricultural cooperatives	trust7	How would you describe your trust in the agricultural cooperatives?	288	3.704	1.107	1	5
Agricultural research organization	trust8	How would you describe your trust in agricultural research organizations?	288	3.562	1.054	1	5
National government	trust9	How would you describe your trust in the National government?	288	3.75	1.097	1	5
County Government	trust10	How would you describe your research in the County government?	288	3.565	1.136	1	5
Neighbor farmers	trust11	How would you describe your trust in the neighbor farmers?	288	3.847	1.058	1	5
Brokers	trust12	How would you describe your trust in aggregators/Brokers as a market outlet for your sunflower	288	2.503	1.550	1	5

Supermarket	trust13	How would you describe your trust in Supermarkets as a market outlet for your sunflower	288	3.083	1.276	1	5
Wholesaler	trust14	How would you describe your trust in Wholesalers as a market outlet for your sunflower	288	3.423	1.111	1	5
Exporters	trust15	How would you describe your trust in the exporters as market outlets for your sun	288	3.604167	1.099374	1	5
Producer group market	trust16	How would you describe your trust in the producer groups as market outlets for your sunflower produce	288	3.739	1.217	1	5
Neighbour farmers market	trust17	How would you describe your trust in the neighboring farmers as a market outlet for your sunflower?	288	3.625	1.109	1	5
Sunflower contribution-household needs	proactive	In general, how would you respond to sunflower entrepreneurship in meeting household needs?	288	2.006	1.165	1	5
Farmer entrepreneurship	enterpreneural1	I usually act in anticipation of future problems, needs, or changes to promote my sunflower enterprise	288	1.784	0.819	1	5
Farmer market search	enterpreneural2	I put in extra effort to find a market for my sunflower production	288	2.298	1.046	1	5
Farmer cost control	enterpreneural3	I put in more effort to minimize the storage cost of sunflower	288	2.031	0.956	1	5
Farmers price negotiation	enterpreneural4	I usually take serious price negotiation to minimize loss	288	2.274	1.173	1	5
Farmer entrepreneurial strength	enterpreneural5	I prefer to 'step up and get things done on my farm rather than sit and wait for a solution externally	288	2.048	1.038	1	5
Farmer view	proactiveness	In your own opinion, do you think sunflower commercialization increases support for farm expansion	288	1.75	0.891	1	5
Sunflower commercialization impact	proactiveness	sunflower commercialization meets both utility and profit targets of a household	288	1.847	0.862	1	5
commercialization livelihood	proactiveness	sunflower commercialization can improve farmers' livelihoods	288	2.038	1.002	1	5
Marketing channel contract	proactiveness	I think sunflower marketing channels can be trusted in contracting farmers	288	1.909	0.983	1	5
Group Marketing	proactiveness	I think group marketing of sunflower can reduce storage and transportation cost	288	1.868	0.931	1	5

Smallholder Farmers Trust in Sunflower Commercialization Institutions

The findings show that agricultural cooperative trust, media trust, and national government trust aspects among smallholder sunflower farmers have strong positive loadings and lower unique values (0.823- 0.322, 0.805- 0.351, and 0.804-0.354, respectively) on sunflower commercialization. On the other hand, producer group trust, farmer group, and neighbor farmers trust, showed lesser but significant positive loadings and unique values (0.738-0.456, 0.714-0.491, and 0.701-0.509, respectively). The results also noted a proportionate factor rotation of (0.588), revealing an average variance proportion of 58.76%. Further, the results indicated a substantial common variance with neighbor farmers having higher individual KMO values (0.962) while County government trust had a particular KMO value (0.932). The overall individual KMO value (0.948) for the summary measure was above the accepted threshold of 0.5. Also, this study's results showed a reliability scale of 0.929 (Table 2).

Table 2: Smallholder Farmers Trust, KMO, Alpha test, and Proportionate variance estimated on Sunflower Commercialization Institutions

Variable	Factor Loadings	Uniqueness	Kaiser Meyer Olkin	
Producer group	0.738	0.456	0.931	
Farmer group	0.714	0.491	0.946	
Community action group	0.765	0.416	0.943	
Extensionists	0.774	0.401	0.955	
Private agents	0.76	0.422	0.937	
Media	0.804	0.354	0.95	
Agricultural cooperatives	0.823	0.322	0.954	
Agricultural research	0.779	0.393	0.954	
National government	0.805	0.351	0.956	
County Government	0.761	0.42	0.932	
Neighbor farmers	0.701	0.509	0.962	
Overall Keiser Meyer Olkin			0.948	
Alpha Scale Reliability			0.929	
Proportionate variance estimated	0.588			

Smallholder Farmers Trust in Sunflower Commercialization Market Outlets

Smallholder farmers' trust for brokers as a market outlet for factor 1 was low (0.039) but high for factor 2 (0.929) with a unique value score (0.135). These farmers' trust in neighbour farmers market outlet had a moderate value (0.708) for factor1 and a low value (0.146) for factor2 with a unique score value (0.171). Also, the wholesaler's market outlet indicated a relatively high value for factor 1 (0.606) and factor 2 (0.604) with a unique value (0.269). Exporters market outlet also had a high value for factor 1 (0.809) but a lower value (0.132) for factor 2 with a unique score value (0.260). This study results showed supermarket outlets had a moderate value (0.335) for factor 1 and a high value (0.859) for factor 2 with a low unique value (0.150).

Further, the producer group market outlet indicated a high value (0.901) for factor 1 and a low value (0.132) for factor 2 with a unique value score (0.171). This study found a factor rotation loading of (2.448) for factor 1 and a difference of (0.357). However, factor 2 had a factor rotation loading of (2.090), thus a cumulative average variance proportion of 75.64% (Table 6). Additionally, the KMO values for the measuring variables and the overall (0.788) exceeded the accepted 0.6. The neighbor farmer's market outlet had the highest KMO value (0.895), while the brokers had the lowest (0.707). The results also indicated a reliability scale of 0.8374 (Table 3).

Table 3: Smallholder Farmers Trust, KMO, Alpha test, and Proportionate variance estimated in Sunflower Commercialization Market Outlets

Market outlet	Factor loading1	Factor loading 2	Uniqueness	Keiser Meyer Olkin	
Brokers	0.039	0.929	0.135	0.707	
Supermarket	0.335	0.859	0.149	0.749	
Wholesaler	0.606	0.604	0.269	0.868	
Exporters	0.809	0.293	0.259	0.803	
Producer group	0.901	0.132	0.171	0.738	
Neighbor farmers	0.708	0.146	0.477	0.895	
Overall Keiser Meyer Olkin				0.788	
Alpha Scale Reliability				0.837	
Proportionate variance estimated	0.408	0.348			

Smallholder Farmers' Entrepreneurial Effectiveness on Sunflower Commercialization

The results indicate that farmer entrepreneurship ability has a moderate positive correlation (0.591) with a unique value (0.650) under factor 1. The study's results showed farmer market search to have a relatively strong positive correlation (0.738) with a unique value score of 0.455 under factor 1. Also, farmers' storage cost control had a high positive correlation (0.829) with a relatively low unique value score (0.313) under factor 1. Further, farmer price negotiation showed a strong positive correlation (0.762) with a unique value score of 0.419 under factor 1.

Additionally, farmer entrepreneurial strength showed a relatively high positive correlation (0.788) with a lower unique score value (0.399). The results also showed a factor loading of (2.783), revealing an average variance of 55.66%. The findings revealed an overall KMO value (0.824), with farmer entrepreneurial ability having the highest value (0.876) and farmer storage cost control showing the lowest value (0.796) but within the accepted threshold (0.6). The findings also had a scale reliability coefficient of 0.797, which was relatively above the threshold of 0.7 (Table 4).

Table 4: Smallholder Farmers Entrepreneurial View, KMO, Alpha test, and Proportionate variance estimated on Sunflower Commercialization

Farmers	Factor loadings	Uniqueness	Keiser Meyer Olkin		
Entrepreneurship ability	0.591	0.65	0.876		
market search	0.738	0.455	0.845		
storage cost control	0.829	0.313	0.796		
price negotiation	0.762	0.419	0.819		
entrepreneurial strength	0.788	0.379	0.819		
Overall Keiser Meyer Olkin			0.824		
Alpha Scale Reliability			0.797		
Proportionate variance estimated	0.557				

Smallholder Farmers' Proactiveness on Sunflower Commercialization

Sunflower commercialization contribution has a moderate positive correlation (0.603) with a unique value (0.636) under factor 1. The results also show a strong positive correlation (0.817) for farmers' view on sunflower commercialization support to household needs with a relatively low unique value score (0.333) under factor 1. The findings, too, reveal a high positive correlation (0.781) with a unique value (0.391) under factor 1 for the sunflower commercialization efficiency. It was also noted that commercialization impact exhibited a strong positive correlation (0.842) with a lower unique value (0.292) under factor 1. Further observation indicated a relatively strong positive correlation (0.736) with a moderate unique value (0.458) under factor 1 for the farmers' trust in the contractors as their marketing channel.

This study's findings show a factor rotation loading of (3.510), revealing an average variance of 58.51% (Table 12). Further, the findings show a high positive correlation (0.787) with a relatively low unique value (0.381) under factor 1. The results indicate an overall KMO value (0.844), with the farmers' group marketing having the highest KMO value (0.888), while the marketing channels contract trust had the lowest KMO value (0.811). The study also revealed a scale reliability coefficient of 0.848 (Table 5).

Table 5: Smallholder Farmers Proactiveness, KMO, Alpha Test, and Proportionate Variance Estimated on Sunflower Commercialization

Variable	Factor1	Uniqueness	Keiser Meyer Olkin	
sunflower commercialization contribution	0.603	0.636	0.848	
Farmers view commercialization support	0.817	0.333	0.848	
Sunflower commercialization efficiency	0.781	0.391	0.84	
Commercialization impact	0.842	0.292	0.82	
Marketing channels contract trust	0.736	0.458	0.811	
Group Marketing	0.787	0.381	0.888	
Overall Keiser Meyer Olkin			0.844	
Alpha Scale Reliabilty			0.848	
Proportionate Variance Estimated	0.585			

Principal Component Analysis of Smallholder Farmers' Perception of Sunflower Commercialization Results Discussion

This study's results show that smallholder farmers have diverse perceptions of sunflower commercialization based on the commercializing institution's role, entrepreneurship traits, trust in market outlets, and proactiveness in sunflower commercialization aspects. Agricultural cooperatives, media, and national government trust strongly affected smallholder sunflower farmers' response to their trust in the various commercialization institutions. This could be attributed to legalism involved in the agriculture cooperatives and government and the reduced cost of access to agriculture information through media. The low unique values on these three institutions suggested that these variables have explained sunflower commercialization variance and significantly influence sunflower farmers' engagement in commercializing their produce.

Despite producer groups, neighbour farmers, and farmer groups' trust having lower positive factor loadings in this study, they significantly appealed for their crucial role in sunflower commercialization processes. The small mean, in general, sunflower farmers' trust in these institutions communicates their little trust in the role they play in sunflower commercialization. The average variance proportion implies that the measurement variables have explained a significant proportion of observed variables and substantially account for the variability in the data. Further, the high KMO value and reliability scale showed the adequacy of the measurement variables and data consistency.

This study's results could be attributed to the smallholder farmers' counterintuitive experiences in farmer groups, especially failure to meet their expectations, stabilize their markets, or fall-out along group membership, thus camouflaging trust in the institutions. Most sunflower farmers were less involved in farmer groups based on their different attitudes on the institution. Additionally, the lack of external support and poor mobilization to facilitate these groups renders the sunflower smallholder farmers vulnerable to economic shocks. Sunflower smallholder group members' trust could be built on their interaction and self-organization in increasing knowledge and social capital resources. Studies postulate that members' social capital networks necessitate active participation; however, Giddens' social theory of structuration suggests that formal and informal institutions regulate members' behaviour and rules (23). This theory can positively address smallholder farmers' constraints, especially those that shape their attitudes towards these institutions, including control of network dynamism, which inhibits knowledge. This study's results differ from those (24), which explicitly revealed different levels

of farmers' trust in various institutions among smallholder farmers and high trust in other farmers and agribusiness advisors in Inland Northwest.

Also, sunflower farmers' trust in the marketing channel was assessed based on six marketing outlets. The cumulative variance proportion implies that combining the two factors influences the total variance in explaining sunflower farmers' trust in the outlined market outlets. A KMO value of 0.788 and a reliability scale of 0.837 indicated that the variables used in the measurement were significantly correlated. From the results, sunflower farmers trust various market outlets differently. They moderately trust wholesalers for factors 1 and 2 and only supermarkets under factor 1. Sunflower farmers, too, trust high exporters, producer groups, neighbour farmers, and lowly trust brokers under factor 1. Contrarily, under factor 2, they lowly trust exporters, neighbor farmers, and producer groups.

Further, they highly trust brokers and supermarkets under factor 2. The study results align with those of (25), who showed a significant impact of trust on smallholder farmers' choice of market outlets. The results also conform to those of (26), who confirmed that smallholder farmers would opt for low prices through immediate sales due to constraints in accessing better markets.

Trust among smallholder farmers in different outlets could be associated with building networks and loyalty over screening their agricultural produce. Existing trust between farmers and buyers promotes reliance on specific agricultural investments, which enhances sunflower commercialization among them. Smallholder farmers can engage in sunflower commercialization without fear of opportunism from their preferred market outlets, which could include late payments, high cost of delivery, and poor screening services.

The results suggest different factors related to sunflower farmers' entrepreneurship. Sunflower farmers' entrepreneurship strategy "I usually act in anticipation of future problems, needs, or changes to promote my sunflower enterprise," market search "I put in the effort to find a market for my sunflower production;" storage control cost "I put in the effort to minimize storage cost of sunflower produce," price negotiation "I usually take serious price negotiations to minimize loss in my sunflower produce" and entrepreneurship strength "I prefer to 'step up' and get things done in my farm rather than sit and wait for external solution" are positively correlated to sunflower farmers' entrepreneurial attitude.

However, the unique value scores for farmer entrepreneurial ability, market search, and price negotiation suggest that additional factors could shape farmers' attitudes toward sunflower entrepreneurship. The average variance proportion communicates the substantial portion of the observed variables explained. The study results in overall KMO value for farmers' entrepreneurship imply the suitability of variables for the study and a reasonable consistency level in measuring farmers' entrepreneurial attitude. The study results support those of (27), who revealed that price negotiation and cost control aspects impact farmers' participation in the output markets in China.

Results on smallholder farmers' entrepreneurship imply that they could encounter different family, farm rurality, or communal constraints that limit their market integration to output markets. These factors peculiarly interplay between community, farm, and family constrain them from exploiting market opportunities. Further, debates on family farm business keep arguing about family as a central among smallholder farmers, which does not reveal the entire context of smallholder farmers' commercialization (28). Additionally, family farm entrepreneurship results could be attributed to the farmers' unclear metasystems stressing farm business and individual social systems, as studies postulate them to overlap (29).

Sunflower farmers expressed different proactive rates based on the five items used to measure their views. The results reveal farmers' views: "In your own opinion, do you think sunflower commercialization increases support to household needs?", commercial impact "sunflower commercialization can improve smallholder farmers livelihoods," and commercial efficiency "sunflower commercialization meets both utility and profit targets of a household" to shape sunflower farmers proactiveness on sunflower commercialization. The average variance proportion implies that the extracted factors account for a considerable portion of the total variance, thus explaining the observed patterns of proactiveness.

Further, farmers' trust in contractors influenced farmers' proactiveness but could better be explained by additional factors. However, farmers moderately considered sunflower commercialization contribution to influence their proactiveness. The average variance proportion implies that the extracted factors account for a considerable portion of the total variance, thus explaining the observed patterns of proactiveness. An overall KMO value of 0.844 suggested data adequacy for factor analysis and a reliability coefficient that implied high measurement consistency.

This study's results could be attributed to smallholder farmers' preference decisions as portrayed in past studies (30; 31), that consumer preference information on specific products dictates farmers' capability and choice of channeling resources to produce and market their agricultural outputs. Consumer preference requires rational decisions by these farmers to balance their utility and profit targets to break even. Access to credible market information improves the quality of decisions farmers make. They tend to keep using the information in effective agricultural production and marketing choices, increasing their proactiveness on sunflower commercialization.

This study's results support those of (32), who admitted that farmers' proactiveness is steered by their ease of information access and efforts to search for better markets. Further, applying the accessed credible information by smallholder farmers stimulates their ability to step up and resilience in the sunflower commercialization supply chain. The study also aligns with those of (33) that revealed market preference, timely action, credibility, and application of market information to enhance smallholder farmers' orientation toward entrepreneurial activities.

IV.   Conclusion And Recommendation

Conclusion

The smallholder farmers express different heterogeneity of attitudes towards sunflower commercialization. They consider associated costs, profits, trust level in the institutions, and market outlet familiarity, shaping their perception of sunflower commercialization. Smallholder farmers experience alternative market outlets for their produce that determine their choice and impact on household generation of income. They choose a specific channel for sunflower production with the expectation of utility and profit gain from the selected channel. This study established that sunflower smallholder farmers' trust in agricultural cooperatives, media, and national government significantly affects their sunflower commercialization. Facilitating farmers' access to information from these institutions through media support, empowerment of agricultural cooperatives, and national government direct promotion of farmers' knowledge would positively impact smallholder farmers' perception of sunflower commercialization.

Further, smallholder farmers highly had confidence in producer groups, neighbour farmers, and exporters as their market outlet. They moderately trusted wholesalers but lowly trusted brokers and supermarkets. They also had conflicting opinions on brokers as their market outlets were easily accessed despite low pricing and information asymmetry. Regulation of brokers' opportunistic behaviour toward smallholder farmers would better them as a market outlet for sunflower due to their convenience. Additionally, smallholder farmers' enlightenment and access to market information would relieve them of conflicting decisions on the market prices for their produce that would subsequently fetch high prices for sunflower. Additionally, farmers' entrepreneurship and proactiveness impacted their engagement in sunflower commercialization.

Recommendation

The study recommends that smallholder farmers actively seek and engage in collaborative actions to help them make informed decisions, better their bargaining power, access valuable market insight, and explore each market outlet through potential risk assessment. This will boost their knowledge and empower them to seek training and workshops on market dynamics and price negotiation strategies. It will also enhance smallholder farmers' innovation through value-addition and entrepreneurship, promoting sunflower product differentiation, thus increasing its commercialization.

Agricultural policy institutions and the government should strengthen agricultural cooperatives by providing technical support and training resources via media campaigns and digital platforms awareness. This will enable more access to market information for smallholder sunflower farmers. Implement transparency enforcement, information asymmetry address, and fair pricing strategies to regulate brokers' opportunistic behaviour. Further, availing incentives through infrastructure investment will counter transport and storage costs among sunflower farmers and their corresponding markets, thus facilitating sunflower commercialization. Additionally, if the sunflower commercializing policy institutions and the government can offer training programs on entrepreneurial orientation among smallholder sunflower farmers, it could improve their skills and proactiveness in sunflower commercialization.

Further, international market buyers and exporters should prioritize fair trade practices such as transparency pricing, long-term fostering of farmers' relationships, and ethical sourcing through streamlining trade regulations, which will widen opportunities for sunflower commercialization. International market collaboration with the government and local institutions to invest in infrastructure would benefit Sunflower smallholder farmers directly. Inclusion of these recommendations into their practices and policies can improve sunflower smallholder farmers' perception of sunflower commercialization, enhance their profitability, and promote sustainable agricultural practices.

Conflicts Of Interest
The authors have not declared any conflict of interest.

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