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Determinants of Sesame Marketing Outlet Choice: The Case of Bench Maji Zone, Southwest Ethiopia

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ABSTRACT

The study was aimed at analyzing sesame market outlet choice in Bench Maji Zone of south western, Ethiopia. For addressing this objective, the study used both primary and secondary data obtained from cross-sectional field survey, focus group discussion and key informant interview. Multistage random sampling technique was used to draw 270 sesame producers.Descriptive statistics and econometric method of data analysis were used to analyze the data. Depending on the results obtained from multivariate probit model, this study recm mend that strengthening farmers sesame cooperative and enhancing the financial capacity of cooperative, impro ving accessibility of transport services and developing infrastructure, improving farmers' knowledge through ad ult education as well as their experience sharing with other sesame producing farmers, improving productivity th rough strengthening supportive institutions, motivating sesame producing farm household to participate different training. Therefore, those important socioeconomic and institutional factors which are mentioned above must take into account to improve the productivity of sesame in the study area.

Keywords: Bench Maji, Market Outlet Choice, Sesame, Multivariate, Probit

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1. INTRODUCTION

The oilseeds sector is one of Ethiopia's fastest-growing and important sectors, both in terms of its foreign exchange earnings and as a main source of income for over three million Ethiopians. Sesame is now Ethiopia's second largest agricultural source of foreign revenue earnings after coffee (Sorsa, 2009). It accounts for over 90% of the values of oilseeds exports from Ethiopia to the world. Increasingly, sesame seed is taking a significant role in the oilseeds sector over the past years and has become the most relevant commodity (NABC, 2015). In Ethiopia, sesame is commonly cultivated in areas ranging from 500 to 1300 meters above sea level in rain-fed condition. The low lands of Ethiopia adjoining Sudan are the traditional sesame growing areas. Sesame mainly grows in the Tigray, Amhara and Oromia regions of Ethiopia. SNNPR is also becoming an area of sesame production and attraction for investors because it produces sesame that meets international standards. In 2012/13, 893,883 small holder farmers actively participated in producing 244,784 MT of sesame from 337,505 hectares of land (CSA, 2015). In addition, different reports indicate that there is still potential arable land in different areas of the country to grow the crop and there is a considerable demand for Ethiopian sesame seed at international markets (Sorsa, 2009). This indicates that, growth and improvement of the sesame sector can substantially contribute to the economic development at national, regional and family levels. Sesame production is increasing in Ethiopia especially in southwest and northwestern parts of the country which is driven by high market value and suitability of environmental conditions (Wijnands *et al*., 2007).

Nowadays, sesame mainly grows in selected district of Bench Maji zone in a wide range. However, sesame production and productivity in the study area is not comparable with the productivity of other region in the country. Besides low productivity, the study area faced with various challenges like: marketing problems that need to be addressed. These include, poor market infrastructure, long and traditional marketing channels among others. Market infrastructures are poorly developed in the major producing areas. The absence of adequate road network, market information and warehouse facilities has lowered the quality of sesame product and competitiveness of exports.

Marketing outlet choice is one of the most important farm household decisions to sell their produce in different marketing outlets and has a great impact on household income (Shewaye 2016). Market outlet choices are a household-specific decision, and several drivers have to be considered as a basis for such decision. Various empirical studies pointed out that smallholder farmers' decision to choose different market outlets can be affected by household characteristics, resource endowments, and access to different market outlets, prices, and transportation cost (Moti and Berhanu, 2012; Berhanu *et al.,* 2013; Shewaye 2016) and they confirm that lack of market knowledge or difficulties in accessing markets that are more rewarding makes smallholder farmers to transact their produce through an outlet offering low price.

A number of studies have been done in relation to sesame marketing and its efficiency. For example, studies of (Ermiyas *et al*., 2015; Terefe, 2016; Fikiru *et al.,* 2017) have only covered issues on new varieties, productivity, marketing practices, marketing functions and value chain from the farmer to consumer in terms of handling, efficiency level of farm household's detailed information on the existing structure and factors influencing profitability of the crop at the farm level in different part of the country. However, there were no comprehensive earlier studies which investigated the factors affecting sesame producers' market outlets' choice decision is in the study area where there was a room in sesame production. Thus, research in this area is vital for understanding the problems related to the sesame market outlet choice decision and its determinants. Therefore, the current study was focus on narrowing the information gap and trying to provide an in depth analysis of sesame market outlet choice in Bench Maji zone with the objective of identifying the major factors affecting households decision to choice market outlet.

2. RESEARCH METHODOLOGY

In this chapter, description of the study area, techniques of data collection, sampling technique, methods of data analysis and definition of variables hypothesized were presented.

2.1. Description of the Study Area

The study was conducted in Bench Maji zone. It is one of the zones in Southern Nations, Nationalities and Peoples' Regional State. The zone capital city is Mizan Aman which is at about

584 km away from south west of Addis Ababa. Bench Maji zone has a total area 19965.90 km^2. It lies between $5^0$33'-$7^0$21' latitude and $34^0$88'-$36^0$14'longitude with an elevation ranging 500 up to 2005 meters above sea level. The zone has 10 Districts with a total population (in 2011) is estimated about 738,886. The agro-ecology of the zone, out of the total land size 52% Kola, 43% Weinadega and 5% Dega (BMZANRDD, 2018). The mean annual temperature of the zone ranges between 15.1-27^0c and the mean annual rain fall ranges 400-2000mm. According to the land utilization data of the region, 174,678 ha cultivated land, 335,030 ha forest, bushes and shrub covered land,79,248 ha grazing land, and 493,395 ha of land is covered by others. The zone has total a road length of 944.14km. Out of the total length, 468 km is gravel road, and 476.14km is dry weather road.

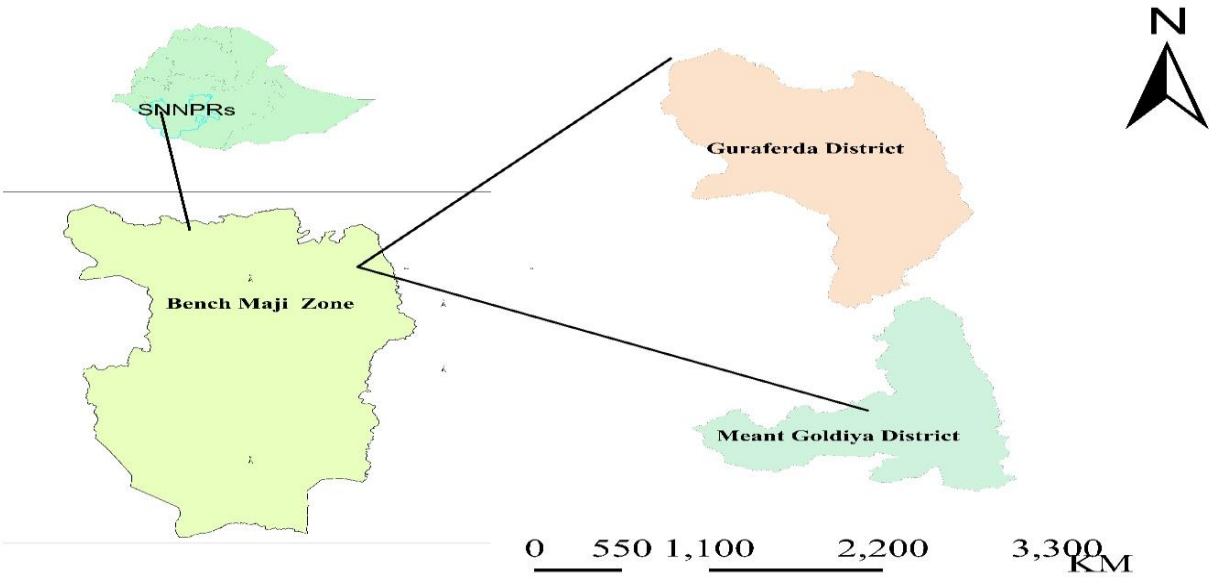

Figure 1. Map of the study area

2.2. Types, Sources and Methods of Data Collection

In order to generate the data, both primary and secondary data sources were used. Primary data were collected from a cross sectional sample representative farm households from four rural *kebeles* through semi structured questionnaires. In addition, FGD and key informants interview were used to strength the survey result. Secondary data sources obtained from both woreda, Bench Maji Zone agriculture office, governmental and non-governmental institutions including both published and unpublished documents. Before embarking on collection of the actual primary data,

strong attention was paid while formulating questions with respect to clarity and logical order. In order to obtain the important data, firstly individuals who completed grade 10 and above were selected as enumerators. Secondly, these enumerators were taken training and orientation with close supervision of the researcher. Then finally, the enumerators were collect the required data through questionnaires. Furthermore, interview and focus group discussion were held. Secondary data were also collected from different organization at zonal and district level regarding the baseline general information to support the primary data.

Figure 2: Photograph shows focus group discussions, interview with individual household heads and wholesalers

2.3. Sampling Technique

Multistage sampling technique was employed for this study. In the first stage, two Woredas, namely Meinit Goldya and Meinit Shasha were selected purposively based on the potentiality of

sesame production from Bench Maji zone*;* based on the information obtained from the zone Agricultural and natural resource department. In the second stage, *Kebeles in* each woreda were grouped in to sesame growers and non-growers. In the third stage, among the sesame growing kebeles, seven kebeles (four kebeles from Guraferda and three kebeles from Meinit Goldia Woreda respectively) were selected randomly. In the last stage, from 9210 sesame producers in the two Woreda, 270 samples of household heads were selected randomly, using probability proportionate to size. Sample size was determined following a simplified formula provided by (Yamane, 1967). Accordingly, the required sample size at 95% confidence level with degree of variability of 5% and level of precision equal to 6% was used to determine a sample size required to represent the population.

$$n = \frac{N}{1+N(e)^2} = \frac{9210}{1+9210(0.06)^2} = 270 \text{ Households} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

Where, $n =$ sample size, $N =$ population size (sampling frame) and $e =$ level of precision considered 6%. Also, 100 wholesalers were selected and interviewed.

Finally, a total of 270 sample households was selected for interview as presented in Table 1 below.

Table 1. District, Kebeles, number of households, and sample size selected from sample

Zone	District	Kebeles	Sesame producing HHs	Sample size	Percent
Bench Maji	Gurafarda	Kuja	428	31	11.48
		Gabika	470	34	12.59
		Semerta	456	33	12.22
		Sega	401	29	10.74
	Manit Goldeya	Kushanta	622	45	16.67
		Dega	670	47	17.41
		Genbab	705	51	18.89
	Total		3752	270	100

Source: Own sampling design, 2019

2.4. Method of data analysis

2.4.1 Descriptive Analysis

Descriptive statistical tools such as mean, variance, percentages and standard deviations were used in the process of examining and describing socioeconomic and demographic characteristics of

sesame producers. Moreover, different test like was used to make comparisons between different groups of households with respect to the characteristics under consideration.

2.4.2 Econometric analysis

The selection of analytical models depends on the objectives that were achieved and the hypothesis to be tested and verified. Even if the nature of data determines the types of model that was employed in the study, different alternative models are hypothesized below according to the requirement needed from the data to fit either of one models. So, the models are specified below accordingly. In econometric analysis, different author used different econometric models such as multinomial logit, multivariate probit and other limited dependent variable for market outlet choice without any comparison, even if the models have different properties. Therefore, making comparison between two competing models (multinomial logit and multivariate probit) and choosing the appropriate one would results best outcome of the study finding. Multinomial logit models are appropriate when individuals can choose independent outcome from among set of mutually exclusive alternatives. Multinomial logit models can be used to predict a dependent variable, based on categorical independent variables, where the dependent variable takes more than one forms (Griffiths *et al*., 2001). In reality there may be several market outlets (such as: wholesalers, collectors, cooperative and consumers) and farmers have the possibility to select more than two outlets simultaneously to maximize the expected utility. So, using multinomial logit model for such outlet choice study is not viable due to the possibility of simultaneous choices of outlets and the potential correlations among these market outlet choice decisions. Multivariate probit model simultaneously models the influence of a set of explanatory variables on the choice of market outlets, while allowing for the potential correlations between unobserved disturbances, as well as the relationship between the choices of different market outlets (Belderbos *et al*., 2004).. Multivariate probit model is a preferred model because choosing one outlet can be affected by the relative risk of choosing the other (Greene 1993). In this study, since many farmers were selling sesame outputs to more than one market outlets, Multivariate probit model was used to identify factors affecting market outlet choices of sesame producers. And, the modeled for multivariate probit can be specified as follows:

The observed outcome of market outlet choice can be modeled by the following random utility formulation. Consider the i^{th} farm household (i=1, 2….. N), facing a decision problem on whether or not to choose available market outlet. Let U_O represent the benefits to the farmer who chooses trader, and let U_K represent the benefit of farmer to choose the k^{th} market outlet: where K denotes the number of outlet where, choice of wholesalers designated by (X_1), cooperatives (X_2), rural sesame collectors (X_3) and consumer (X_4). The farmer decides to choose the k^{th} market outlet if $X_{ik}^* = U_K^* - U_O > 0.$ (2)

The net benefit (X_{ik}^*) that the farmer derives from choosing a market outlet is a latent variable determined by observed explanatory variable (Z_i) and the error term (ε_i) :

$$X_{ik}^* = Z_i'\beta_k + \varepsilon_i \; K = (X_1, X_2, X_3, X_4) \quad (3)$$

Using the indicator function, the unobserved preferences in the above equation translates into the observed binary outcome equation for each choice as follows:

$$X_{ik} = \begin{cases} 1 \; if \; X^*ik > 0 \\ 0 \; Otherwise \end{cases} \quad (K = X_1, X_2, X_3, X_4,) \quad (4)$$

In multivariate model, where the choice of several market outlets is possible, the error terms jointly follow a multivariate normal distribution (MVN) with zero conditional mean and variance normalized to unity (for identification of the parameters) where $(\mu_{x1}, \mu_{x2}, \mu_{x3}, \mu_{x4,})$ $MVN \sim (0, \Omega)$ and the symmetric covariance matrix Ω is given by:

$$\Omega = \begin{bmatrix} 1 & \rho x1x2 & \rho x1x3 & \rho x1x4 \\ \rho x2x1 & 1 & \rho x2x3 & \rho x2x4 \\ \rho x3x1 & \rho x3x2 & 1 & \rho x3x4 \\ \rho x4x1 & \rho x4x2 & \rho x4x3 & 1 \end{bmatrix} \quad (5)$$

Following the form used by [8], the log-likelihood function associated with a sample outcome is then given by;

$$\ln L = \sum_{i=1}^{N} \omega_i \ln \Phi(\mu_i, \Omega) \quad (6)$$

Where ω is an optional weight for observation i, and Φ_i is the multivariate standard normal distribution with arguments μ_i and Ω, where μ_i can be denoted as;-

$$\mu_i = (k_{i1}\beta_1 Z_{i1}, k_{i2}\beta_2, k_{i3}\beta_3 Z_{i3}), \text{While } \Omega_{ik} = 1 \; for \; j = k \; and \quad (7)$$

$$\Omega_{jk} = \Omega_{kj} = k_{ij}k_{ik}\rho_{jk} \; for \; j \neq k, k = 1,2,3.....with \; k_{ik} = 2x_{ik} - 1$$

The explanatory variables expected to have influence-dependent variable are summarized as follows (Table 2):

Table 2 Summary of hypothesized variable that determines sesame producers' market outlet choices

Description of Variable	**Type**	**Expected sign**
Dependent variables	**Categorical**	
Market outlet choice decision		
1 if producers choose wholesalers		
2 if producers choose retailors		
3 if producers choose collectors		
4 if producers choose consumer		
Independent variables		
Years of farming experience	Continuous	- /+
Sex of the household	Dummy, 1 = yes 0= no	±
Household head size	Continuous	-/+
Education status of the household	Continuous	+
Proximity to the local market	Continuous	-
Lagged year price of sesame	Continuous	+
Frequency of Extension contact	Continuous	+
land allocated to sesame	Continuous	+
Amount of Credit received	Continuous	-/+
Cooperative membership	Dummy 1=member, 0 otherwise	-/+
Non/off-farming income	Continuous	-/+

Source: Own assumption, 2019

3. RESULT AND DISCUSSION

This chapter presents the results and discusses the core findings of the study. Thus, it is organized in two sections. The first section provides descriptive analyses on the demographic, socio-economic and institutional characteristics of sample farm households. The second section presents econometric analyses of sesame market outlet choice and it further discusses the findings of the study in comparison with earlier related research results.

3.1. Socio-demographic characteristics of respondents

Socio-demographic characteristics of the farmers play an important role in either promoting or impeding their participation in agricultural markets. The study result showed that sample household taken for the study purpose involve in marketing of sesame besides to its production because sesame was one of the exportable oil crop. Attributes of the farm households (such as sex, age, farming experience, and household size and education status) play crucial role in either promoting or impeding crop productivity. As indicated in Table 3, the majority of the sample households were male-headed (with nearly 84.81 %) and the mean age of respondents was 39.63 years with a minimum of 27 years and a maximum of 60 years. Females became household heads if they were either divorced or widowed or male are incapable of being the household head due to health problem. Sample farmers on average have about 7 years of experience in sesame farming. With respect to educational level of the sample households the average number of years of schooling completed was 3.5 years with a standard deviation of 2.6 years.

Table 3. Summary statistics of variables

Variables	**Obs**	**Mean**	**Std. Dev.**
Age of household head	270	39.63	5.49
Sesame farming experiences	270	7.11	4.66
Household size	270	5.11	1.93
Education level of household	270	3.50	2.58
Land under sesame	270	0.52	0.598
Off/non-farm income	270	1645.20	2713.12
Tropical livestock unit	270	5.08	1.58
Distance to nearest market	270	12.54	9.17
Sex of household		**Freq.**	**Percent**
	Female	41	15.19
	Male	229	84.81
Training			
	Yes	122	45.19
	No	148	54.81
Credit Access			
	Yes	112	41.48
	No	157	58.52
Cooperative membership			
	Member	156	57.78
	Non member	114	42.22

Source: Own computation from survey result, 2019

Socio-economic and institutional characteristics of farm households refer to physical endowments, income and infrastructure in line with sesame market outlet choice. Particularly, ownership of physical resources and access to institutions are important factors that determine the operation and decision making activities of smallholder farmers. The most important resources of farmers include land holding, livestock ownership, and other materials as indicated in Table 3. Considering the socio-economic profile, sample households who produce sesame and participated in output markets were relatively and significantly better in their land holding, income obtained from off/non-farm activities. Asset holdings like land and total livestock are essential factors for marketable surplus production at a smallholder level. The average area of land allocated to sesame production per household was 0.52 hectares with standard deviation of 0.9. The minimum and maximum land allocated for sesame production was 0.125 and 5 hectare respectively. The number of livestock holding of the households was measured in tropical livestock unit (TLU). Livestock are farmer**'**s important source of income, food, fertilizer, power for crop cultivation and

transportation of produces. As indicated in table 4 the average livestock holding was 5.08 TLU with the standard deviation was 1.58 and the minimum and maximum livestock ownership of 0 TLU and 7.31 TLU respectively. Marketing of sesame production inputs were almost undertaken in the district town. The average distance to travel from home to the nearest market by farmers in the study area was 12.54 km with standard deviation of 9.17.

Farmers access to credit may reduce the effect of financial constraints and able to buy the necessary inputs which improves their sesame productivity more readily than those with no access to credit. It is one of the important institutional service which was required by the respondents in the study area. Therefore, it is expected that access to credit can increases production of sesame. Even if credit services enhance the productivity level of farmers, there is lack of attention to access and availability of credit from formal institution rather than borrowing from informal sources (friends, relatives or village money lenders). Those households who have access to credit receive from their relative and friends in the form of cash or in kind. However, the majority (58.15%) of the households did not have access to credit services due to shortage of credit service, high interest rate and short repayment period of the received loan. Credit and saving institutions, cooperatives, and micro finance institution are some of the credit provider institutions in the study area. Being in cooperatives benefits the majority of farm household, rather than acting individually. According to survey result in Table 3, the majority of household (57.78%) of the household are not members of sesame cooperatives, due to lack of the awareness creation related with the incentives which will be obtained from the membership and the bargaining power in group. Farmers access to training may capacitate ways of applying different organic and fertilizer, reduce the post-harvest loss of sesame product and loss of income which arises from the involvement of many intermediary in sesame market channel. Therefore, it is expected that access to training from different agents can increases production of sesame. From the total respondents 54.81% didn't involve in training.

3.2. Sesame Market outlet

The sampled households were asked that if they choose different sesame market outlets to maximize the profit from their outlet choice decision. Accordingly, they reported that different sesame market outlets were used to sale their sesame produced. These sesame market outlets

include wholesalers, cooperatives, consumers, and collectors. These outlets are mostly chosen in combination with one another.

Table 4 Description of sesame market outlets

Decision	Sesame marketing outlet choice							
	wholesalers		Cooperatives		Consumers		Collector	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Yes	184	68.15	160	59.26	219	18.89	50	18.52
No	86	31.85	110	40.74	51	81.11	220	81.48

Source: Own computation from survey result, 2019.

Table 4 shows the different sesame market outlets used by the beekeepers when selling their sesame. One of the most commonly used market outlets by producers is the wholesalers 'outlet which was chosen by about 68.15 % respondents followed by cooperative outlet which was 59.26%.

3.2.1. Determinants of sesame market outlet choice

To test effects of the different factors on the selection of a particular market outlet, econometric approach was used. The Wald test (χ^2 (48) =141.40 is significant at the 1% level, which indicates that the subset of coefficients of the model is jointly significant and that the explanatory power of the factors included in the model is satisfactory. Furthermore, results of likelihood ratio test in the model LR χ^2 (6) = 67.98 Prob > χ^2 = 0.000 is statistically significant at 1% significance level, indicating that the independence of the disturbance terms (independence of market outlet choice) is rejected and there are significant joint correlations for two estimated coefficients across the equations in the models (Table 5).

The likelihood ratio test of the null hypothesis of independency between the market outlet decision ($\rho_{21} = \rho_{31} = \rho_{41} = \rho_{32} = \rho_{42} = \rho_{43} = 0$:) is significant at 1%. Therefore, the null hypothesis that all the ρ (Rho) values are jointly equal to 0 is rejected, indicating the goodness-of-fit of the model. Hence, there are differences in market selection behavior among farmers, which are reflected in the likelihood ratio statistics. Separately considered, the ρ values (ρij) indicate the degree of correlation between each pair of dependent variables. The ρ_{21}(correlation between the choice for trader and cooperative), ρ_{31} (correlation between the choice for rural collector and

trader markets), ρ_{41}(correlation between the choice for trader and consumer), ρ_{32} (correlation between the choice for rural collector and cooperative markets) are negative and statistically significant at 1% and 10% level respectively and ρ_{43} (correlation between the choice for rural collector and consumer markets) positive and statistically significant at 1% level (Table 5). This finding leads us to the conclusion that farmers delivering to the trader market are less likely to deliver to cooperative market channel (ρ_{21}). Equally, those involved in rural collector market outlet are less likely to send their sesame to the wholesalers (ρ_{31}) (Table 5).

Table 5: Overall fitness, probabilities, and correlation matrix of the market outlets from the MVP model

	Wholesalers	Cooperatives	Consumers	Collector
Predicted probability	0.66	0.59	0.20	0.19
Joint probability success			0.017	
Joint probability of failure			0.06	
Number of draws			10	
Observations			270	
Log Likelihood			-444.78	
Wald(chi2(48)			141.40	
Prob > chi2			0.000	
Estimated correlation matrix				
	ρ_1	ρ_2	ρ_3	ρ_4
ρ_1	1.00			
ρ_2	-0.090(.114)	1.00		
ρ_3	-0.229(.125)*	-0.353(.118)***	1.00	
ρ_4	-0.288(.116)**	-0.416(.111)***	0.772(.065)***	1.00
Likelihood ratio test of $\rho_{21} = \rho_{31} = \rho_{41} = \rho_{32} = \rho_{42} = \rho_{43} = 0$				
χ^2 (6) = 67.98 Prob > χ^2 = 0.000				

Coefficient and standard errors in parentheses; ***, ** and * indicate statistical significance at 1, 5 and 10%, respectively

The simulation results also indicate that the marginal success probability for each equation (outlet choice decision) is reported below. The likely hood of choosing rural collector outlet is relatively low (19%) as compared to the probability of choosing consumer outlet (20%), cooperative outlet (59%) and wholesalers' outlet (66). This is a good evidence to suggest that availability of informal wholesalers' outlet may not be good and profitable for producers. The joint probabilities of success or failure of choosing four outlets suggest that households are more likely to choose jointly the

four outlets. The likelihood of households to jointly choose the four outlets was 1.7% which is relatively lower compared to their failure to jointly choose them was (6%) (Table 5).

The MVP model result in Table 6 revealed that, some of the variables were significant at more than one market outlet while one variable. Out of thirteen explanatory variables included in the model, five variables affected significantly wholesalers market outlet; four variables significantly affected cooperative outlet; collector outlet; and affected consumer market outlet choice at different probability levels.

The likelihood of choosing wholesalers and cooperatives outlet was positively and significantly affected by years of farming experiences at 10% significant level, whereas the likelihood of choosing consumer channel was negatively and significantly affected by years of farming at 10% significant level. This result shows that as the household get more experienced the probability of choosing wholesalers and cooperative market outlet, but decreases the likelihood of choosing consumer outlet. This implies that when household are more experienced in sesame farming and production they become more familiar with market outlet which gives them better return. This result was in line with the finding of Kassa *et al.* (2017) who found that as households with a greater number of year engagement in honey production and marketing are more likely to choose cooperatives outlet. Household size positively and significantly affected by household size at 5% significance level. This implies that if the number household size is large it is used as labor source and they can easily transport it as head carrying to trader's market outlet rather than selling to the farm gate market outlet like collectors. This result was agreed with the finding of Fikru *et al*. (2017) Farmers who have better family size chooses wholesaler market outlet relative to collector outlet. The likelihood of choosing wholesalers market outlet is significantly and positively related with years of schooling of the household head 5% significant level. When sesame producing household become more educated, their realizing capacity is become very high about the importance of different market outlet. Therefore, being educated enhances the capability of farmers in making informed decisions with regard to the choice of outlet to sell their farm produce based on the return and cost. These results were corresponded with the findings of (Riziki *e al*., 2015; Shiferaw *et al*., 2009) that, education level enhances the capability of farmers in making informed decisions with regard to the choice of marketing outlets to sell their farm produce.

Quantity of sesame supply was positively and significantly influences the likelihood of choosing wholesalers and cooperative market outlet at 5% and 10% significance level respectively and negatively influenced the likelihood of choosing consumer and collector outlet at 10% level of significance. Therefore, this result was in line with the finding of Fikru *et al*. (2017) that if the household head is produced more quantity the probability of choice of cooperative outlet increased relative to wholesaler outlet and (Bezabih *et al*., 2015) indicated that large volume of sale motivates households to prioritize the channels and decide to use the best alternative. Those households with large volume of sesame were more likely to sell to wholesalers and cooperative and less likely to sell to consumers' collector outlet. The positive coefficient further implies that large volume of sales motivates households to increase their supply to wholesalers and cooperatives.

The likelihood of choosing cooperative market outlet was significantly and positively affected at 1% significant level by cooperative membership. Being a membership to a cooperative results and increase in the likelihood of choosing cooperative outlet. This is because as households become sesame cooperative member they easily access information about the price of product and they will get share from the future return according the quantity they supply to cooperative. This result was in line with Kassa *et al*. (2017) who found that a member of honey production and marketing cooperatives has the responsibility to supply to its cooperative from their production as a norm of cooperative even if they sell to other outlets. Access to training and participation in training negatively and significantly affect the likelihood of choosing consumer and collector market outlet at 1% significance level. This implies that when the household get training services in related with market and price information about sesame output the likelihood of selling to the consumer and collector market outlet become decrease and the household will go for searching another market outlet which provides better return for their product.

Table 6: Determinant of sesame market outlet choice

Variables	Traders	Cooperatives	Consumers	Collector
Sex of households	.157(.250)	.140(.240)	-.005(.266)	-.209(.262)
Years of experiences	.046(.025)*	.037(.021)*	-.045(.024)*	-.004(.023)
Coop membership	-.225(.205)	.718(.192)***	.157(.211)	.176(.217)
Household size	.109(.054)**	.056(.046)	-.051(.055)	.009(.054)
Education level	.088(.038)**	.038(.035)	-.033(.040)	-.035(.040)
Land under sesame	.012(.218)	.167(.191)	.408(.308)	-.608(.316)*
Quantity supply	.168(.078)**	.115(.068)*	-.175(.092)*	-.189(.094)*
LogOff/non-farm incom	-.002(.027)	-.0003(.024)	.017(.026)	.018(.026)
Credit access	.217(.208)	.136(.192)	.0002(.0019)	.0003(.00 3)
Participating in training	.2567(.188)	-.106(.174)	-.486(.192)***	-565(.198)***
TLU	-.093(.061)	-.05(.057)	.069(.065)	.073(.068)
Proximity to market	-.066(.011)***	-.019(.010)*	.059(.011)***	.054(.011)***
Extension services	-.025(.059)	-.065(.054)	-.062(.064)	-.559(.676)
_cons	-.263(.658)	-.534(.595)	-.557(.657)	-.878(.668)

Coefficient and standard errors in parentheses and ***, ** and * indicate statistical significance at 1, 5 and 10%, respectively.

The likelihood of choosing collector market outlet was negatively and significantly affected by size of land allocated under sesame at 10% levels of significance. According to survey result, households who allocate large size of land for sesame would get output and more likely to sell to other outlet like: wholesalers and cooperative relative to collector outlet. This result was in line with the finding of Nuri *et al*. (2016) who found that area of land covered by *enset* can directly increase the marketable supply of *enset* products and farmers prefer other channels than collectors and consumers to sale large quantity of *bulla*. proximity to nearest market is negatively associated with likelihood of choosing wholesalers and cooperative outlets at 1% and 10% level of significance, respectively but positively associated with likelihood selling to consumer and collector outlet at 1% level of significance. This implies that as the household far away from the market center they prefer to sell their product at farm gate level for collector and local consumer and the probability of delivering to the wholesalers and cooperative outlet become decrease. This is in line with the finding of Solomon *et al*. (2016) distance to cooperatives has negative and significant effect on the preference of farmers for cooperatives and has positive and significant impact on preference of farmers for brokers. Djalalou *et al*. (2015) also, found that market distance has positive relationship with rural market and negative relationship with urban markets.

4. CONCLUSION AND RECOMMENDATION

Agricultural sector in Ethiopia is characterized by its poor performance, whereas the population of the country, which to a large extent depends on agriculture. Sesame is the major cash crop produced by smallholder farmers in Bench Maji Zone and its area coverage and total production has increasing; but was faced short comings of lower productivity. This necessitates seeking for a means to increase agricultural productivity of smallholder farmers and enhancing conducive environment for marketing of the product. Both primary and secondary data sources were used in this study. Primary data were collected through household survey from a sample of 270 households using a semi-structured questionnaire, Key informants interview and FGDs. Secondary data were collected from relevant sources of governmental and non-governmental organizations at different levels (kebeles, district and zonal), cooperatives, websites, published and unpublished reports and books which supplement the primary data. Multi-stage sampling procedure was followed to draw sample households. Also, the method of data analyses that this study used include descriptive statistics and econometric techniques. Most producers sell their products to the wholesalers and cooperative. The multivariate probit model results indicated that Years of experiences, Coop membership, household size, Education level, Land under sesame, Quantity supply, participating in training and Market distance significantly influenced sesame producer's choice of market outlet. Policy implication drawn from the findings aimed at strengthening farmers sesame cooperative a nd strengthening the financial capacity of cooperative, improving accessibility oftransport servic e and developing infrastructure, improving farmers' knowledge through adult education as well a s their experience sharing with other sesame producing farmers. Improving productivity through strengthening supportive institutions (extension service provider) motivating sesame producing farm household to participate different training. Therefore, those important socioeconomic and institutional factors which are mentioned above must be taken into account to improve the productivity of sesame in the study area.

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Competing interests

The authors declare that they have no competing interests.

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