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Value Chain Analysis of Sesame the Case of Bench Maji Zone, Southwest Ethiopia

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Abstract

This study was analyzed value chain analysis of sesame in Bench Maji Zone of Southwestern, Ethiopia. It was specifically aimed to address the research gaps by, identifying the major value chain actors and mapping the value chain, and identifying major factors affecting market outlet choices of sesame producers in Meinit Goldya and Guraferda Districts. For addressing these objectives the study used both primary and secondary data obtained from field survey and desk review. 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. The major value chain actors for sesame marketing in the districts were producers, wholesalers, rural collector, cooperatives, broker/commission agents, retailers, local consumers, ECX, exporters and non-governmental organizations. 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 distance to nearest market significantly influenced sesame producer's choice of market outlet. Depending on results of this study recommend that strengthening farmers sesame cooperative and enhancing the financial capacity of cooperative, improving accessibility of Transport services and developing infrastructure, improving farmers' knowledge through adult education as well as 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 take into account to improve the productivity of sesame in the study area.

Keywords: Value chain; Market outlet choice; Multivariate probit; Bench maji zone.

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 export after coffee in terms of source of foreign revenue earnings [1]. 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 [2].

In Ethiopia, sesame is commonly cultivated in areas ranging in altitude 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 [3]. 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 [1]. 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 [4].

Kaplinsky and Morris [5], outlined three main reasons why value chain analysis is important in this era of rapid globalization. First, with the growing division of labor and the global dispersion of the production of components, systemic competitiveness has become increasingly important. Second, efficiency in production is only a necessary condition for a successful penetration of global markets. Third, entry into global market and making the best use of globalization requires an understanding of dynamic factors that are inherent in the whole value chain. However, the existence of poor linkage among producers and export market that emanate from the involvement of ineffective chain actors along the value chain is a bottleneck for increasing the productivity of sesame output and this in turn discourages the market participation level of sesame producing farm household in the study area.

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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 [6, 7], 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.

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.

Moreover, it is claimed that most of the reviewed value chains or market chain studies on sesame in Ethiopia was little and unable to see value chain and market outlet choice simultaneously. For example, studies of Terefe [8], Ermiyas, *et al.* [9] and Gebremedhin and Jaleta [10] 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 households detailed information on the existing structure and factors influencing profitability of the crop at the farm level in different part of the country. Therefore, this study sought of analyzing the structure of the sesame value chain and determining factors influencing sesame market outlet choice. Virtually, no study has been done on factors determining value chain analysis and market outlet choice of sesame in the study area. Therefore, the current study was focus on narrowing the information gap and trying to provide an in depth analysis of sesame value chain actors and mapping value chain and its market outlet choice in Bench Maji zone.

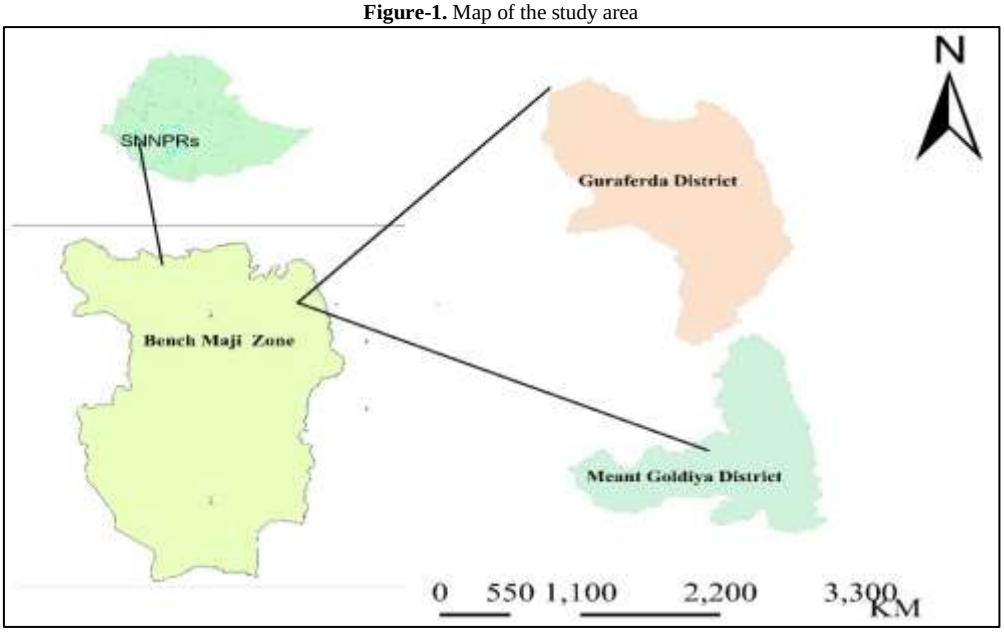
2. Research Methodology

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



Source: ARCGIS, 2018

2.2. Types, Sources and Methods of Data Collection

Both quantitative and qualitative data were used. In order to generate the data, both primary and secondary data sources were used. Primary data was collected from a cross sectional sample representative farm households from

four rural *kebele's* through questionnaires. 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.

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 from both district was selected randomly. In the last stage, from 9210 sesame producers in Bench Maji zone, 270 samples of household heads were selected randomly, using probability proportionate to size. Sample size was determined following a simplified formula provided by Yamane [11]. 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.

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

Where, $n =$ sample size, $N =$ population size (sampling frame) and $e =$ level of precision considered 6%. Also, 100 traders was 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 zone	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, 2018

2.4. Method of Data Analysis

2.4.1. Descriptive Statistics

Descriptive statistical tools such as mean, variance, percentages and standard deviations were used in the process of examining and describing socio-economic and demographic characteristics of sesame producers and chain actors. Moreover, t-test, chi-square test and F-test was used to make comparisons between different groups of households with respect to the characteristics under consideration.

2.4.2. Value Chain Analysis

Value chain analysis is the process of breaking a value chain into its constituent parts in order to better understand its structure and functioning. Value chain analysis is very effective in tracing product flows, showing the value adding stages, identifying key actors and the relationship among actors along the sesame value chain. Methods for analyzing the value chain aim basically at the analyses of the process of value creation and income distribution [12].The analysis consists of identifying value chain actors at each stage and discerning their functions and relationships; determining the chain governance, or leadership, to facilitate chain formation and strengthening; and identifying value adding activities in the chain and assigning costs and added value to each of those activities [13].

Mapping the chain means giving a visual representation of the connections between actors and tracing a product flow through an entire channel from the point of product concept to the point of consumption [14, 15]. Identification of the value chain of sesame (from producers to the ultimate consumers) was done by identifying players in the chain. Under these, the key actors involved in the production and marketing was identified, including the channels used to pass the product until it reaches the ultimate final consumers. The information obtained from key informants that enable to draw the value chain map and relative function of each actor. After getting detailed data collection, the map was adjusted.

2.4.3. Econometric Analysis

Multivariate probit model (mvprobit) will be appropriate and applied to capture household variation in the choice of a market outlet and to estimate several correlated binary outcomes jointly. The dependent variable for the model is discrete variable taking a value of 1, 2, 3, 4 and representing the choices, where 1 represents selling through wholesalers(X_1), retailers(X_2), rural collectors(X_3) and consumers (X_4) respectively. Multivariate probit approach simultaneously models the influence of the set of explanatory variables on choice of markets outlet, while allowing for the potential correlations between unobserved disturbances, as well as the relationships between the choices of different market outlet.

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 private trader, and let U_k represent the benefit of farmer to choose the k^{th} market outlet: where K denotes choice of the k^{th} market outlet if $X^*_{ik} = U^*_K - U_O > 0$.

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) :

$$X^*_{ik} = Z_i\beta_k + \varepsilon_i \quad K = (X_1, X_2, X_5, ,,, X_n \tag{22}$$

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

$$K = (X_1,\ X_2,\ X_3, ,,, X_n$$

$$X_{ik} = \begin{cases} 1 \ if \ X^*_{ik} > 0 \\ 0 \ Otherwise \end{cases} \quad (K = X_1, X_2, X_3, ,,, X_n) \tag{23}$$

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, institutional characteristics of sample farm households, value chain actors and mapping of value chain. The second section presents econometric analyses of sesame market outlet choice it further discusses the findings of the study in comparison with earlier related research results.

3.1. Socio-Demographic Characteristics of Respondents

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. The average age of the sample household, during the survey period, was about 39.59 years with minimum of 21 and maximum of 72 years. The average family size of the sample household heads was 5.48, with a minimum of 2.49 and maximum household size of 12. Also, farmers in the study area stayed in sesame farming on average about 7.07 years as indicated below in (Table 2).

Table-2. Descriptive statistics characteristics of sesame producer households

Variable description	Mean/Frequency	Std./percentage	Minimum	Maximum
Age of household head	39.59	9.66	21	72
Family size	5.48	2.49	2	12
Experience in sesame farming	7.07	3.76	3	22
Education Level Households	2.48	2.10	0	9
Male Headed Households	[247]	[91.48]		

N.B: Variables in parentheses are frequency and percent
Source: Computed from survey data, 2018

As shown in Table 2, of the entire household heads interviewed, about 247(91.48%) were male headed and the remaining 23(8.52%) were female headed households, who are divorced or widowed at the time of survey. This also shows proportion of household head in the sample is much lower than the one at national level (i.e. one fourth of the total rural household head is female). Also, as shown in Table 2, on average a household head has about 2.48 years of formal education. This shows that on average, farmers attended the minimum required education level that is adequate for understanding agricultural instructions provided by the extension workers.

3.2. Socio-Economic and Institutional Characteristics

Socio-economic and institutional characteristics of farm households refer to physical endowments, income and infrastructure in line with sesame value chain. Particularly, ownership of physical resources and access to institutions

are important factors that determine the operation and decision making activities of smallholder farmers. As presented in Table 3 below, the average size of arable land holding in the area was 1.36 hectare with standard deviation of 0.49. The maximum size of arable land holding was 4.5 hectare, which is less than the regional average and the minimum size was 0.35 hectare. The average distance between farm land and sample households' residence was about 3.46 kilometers with standard deviation of 1.47 in the study area. And, about 177(65.56%) of sample households classified their farm land as fertile class in fertility status and the remaining 93(34.44%) households graded it as less fertile/infertile based on their perception on sesame production during survey period.

Table-3. Sample households by resource base, farm and Institutional characteristics

Variable description	Mean/Frequency	Std. Deviation/percent
Total farm land (hectare)	1.36	0.49
Farmers participated in Off/non-farm activities	[196]	[72.59]
Extension contact (Number)	2.78	2.57
Access to training (Trained HHHs)	[115]	[42.59]
HHHs get Credit service	[184]	[68.15]
Cooperative membership (Members)	[156]	57.78
Amount of credit (Ethiopian Birr)	2930.219	3341.735
Distance to market(Kilometers)	5.89	4.16
Livestock holding in terms of TLU	5.72	4.19
Total	270	100

Note: Variables in parentheses are frequency and percent
Source: Computed from survey data, 2018

Also, households are engaged in various off/non-farm activities in parallel with the main farming activities during the farming season in the study area. The off/non-farm income sources in the study area include selling of local drinks, grinding mills, handcraft, leasing house and paid developmental works and beekeeping. As presented in Table 3 out of total sample households 72.59% participated in off/non-farm occupations and the remaining 27.41% were not participated in the activity. During the survey period, the average gross on-farm income of sample households was about 26985 Ethiopian Birr/year. Livestock production is also another important production activity in the study area. It serves as a means of security during crop failure in the districts and plays a vital role in the livelihood of people. The sample households own an average of 5.72 TLU with standard deviation of 4.19. Extension service provision was expected to have direct influence on the production and marketing behavior of the farmers. The higher access to extension service, the more likely that farmers adopt new technologies and innovation. Kebele level development agents are the most important sources of extension services to transfer agricultural technologies and innovations to farmers. The average frequency of extension contact during the cropping season was found to be 2.78 with standard deviation of 2.57 as indicated in Table 3 above.

An appropriate training given to the farmers may improve productivity by enhancing their management capacity. In the study area, farmers get training from FTC (farmers training center), non-governmental institutions or organizations found in the district and surrounding governmental training and research centers. Aslo, 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 As shown in Table 3 above, out of the entire sample households interviewed for this study, about 115(42.59)% of the sample households reported that they received training during survey period and the rest 155(57.41%) had not receive. This indicates that majority of the sample farmers did not received any training which might have impact on the productivity and marketing of sesame growing farmers.

In addition, there exist both formal and informal lending institutions to provide credit in the study area. The formal sources of credit are local cooperative unions, Micro-finance Institutions and Banks, whereas friends, relatives, traders, *Idir Iqub*, etc. are informal sources. As indicated in Table 3 above, on average, farmers took credit up to 2930.219 birr from the formal institutions and informal sources mentioned above survey period. Also, the average distance of market from household's residence is about 5.89. In addition**, b**eing 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.

3.3. Sesame Value Chain Actors and Their Role

Ethiopia wants to realize its potential of supplying sesame to the world market and generate the necessary benefits, both at a macro and micro level, and, in particular, if poor farmers are benefited from this value chain, then all the stakeholders in the value chain need to make a concerted effort to improve the production and productivity of sesame and its marketing mechanisms. Different actors are involved in the entire value chain, from producers to the export market. This section presents the actors and their role in sesame value chain in the study area.

Value chain supporters or enablers provide support services and represent the common interests of the value chain operators. Supporting actors are outsiders to the regular business process and restrict themselves to temporarily facilitating a chain upgrading strategy. Typical facilitation tasks include creating awareness, facilitating joint strategy building and action and the coordination of support activities. These actors play a central role in the provision of

such services and enabling environments include the policies and infrastructure. From the broader perspective, agricultural focused policy of the country might be considered as supportive policy for proper functioning of the sesame value chain development in the country in general and in the study area in particular.

In the same way as to Ghimiray, *et al*. [16], actors and their role is assessed along the different stages of the value chain as; input supply, production, marketing and consumption. In the dominant open-market value chain, until the product is sufficiently bulked up for delivery to the central market, a number of actors are involved in the collection of sesame including sesame producers, wholesalers, retailor, rural collectors, primary cooperatives, ECX, Exporter, NGOs, consumers, research center, service providing in stitution and extension expert. Once it has reached a certain volume for delivery to the central market, brokers are usually contacted to accept the loaded product from a transporter and sell it to the exporter.

Producers: Producers include the small holders and commercial farmers who sell their product to local trader, cooperatives and rural collectors. Like other cereal crops Sesame production system was dominated by smallholder farmers in the study area. Farmers are the first link in the value chain and directly involve in the production activities beginning from land preparation up to delivering product to the different actors. The roles of farmers in sesame production include land preparation, cultivation, planting, weeding harvesting by using different farm tool or machines. Therefore, sesame farming is characterized by low resource use with little mechanization and low productivity in Bench Maji zone as compared to other part of country.

Wholesalers: Wholesalers are also the main actors and the first connection between producers and other actors in sesame value chain. They involved in buying sesame from collectors and producers in large volume than any other actors and sale them to ECX and retailers in small portion. They are licensed bodies without which they are not permitted to operate in sesame markets. Also, they process purchased sesame from different part of the district before supplying to auction market (ECX) warehouse of branch for inspection of quality and grading as depicted in the figure below:

Figure-2. Processing procedure and stored sesame in the traders' warehouse

Rural collector: They move from market to market or door to door on designated market days as well as buying directly from farmers and move sesame from farm gate to traders. These traders are seasonal and operate for a short period after sesame is harvested. Sesame collectors are independent operators who assemble and transport sesame from smallholder farmers, using different transportation means to bring sesame from very remote areas to the market by adding value augmenting the volume. The primary target of those sesame collectors was getting a profit margin that would be obtained from producers share and traders share. Some collectors do not have sufficient capital to purchase sesame. Therefore, they operate with advances that they receive from private traders.

Cooperatives: it is about the association of farmers who are brought together by common interest such as collective interest, learning activities in farmers field school. Framers prefer to sell to cooperatives as they believe the weighing scale is reliable and also expects dividend on patronage. The presence of cooperatives in the district made the private traders to follow the price of cooperatives. However, sometime there was unable due to limited capacity of cooperatives to avail credit at the various levels of production, their members and inability to effect timely payment for produce on installment basis.

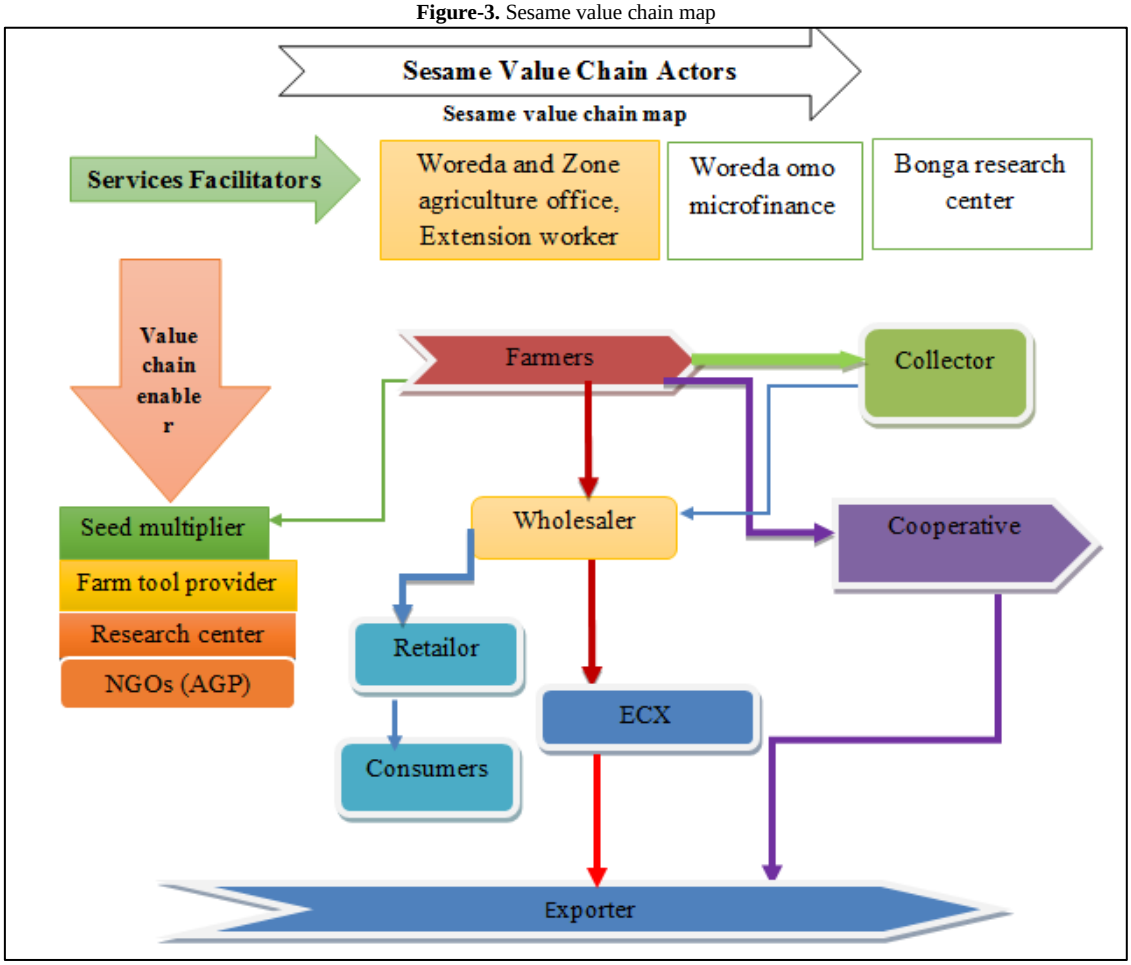
Broker/Commission agents: These categories of the channel members are thus common in sesame value chain. They work on behalf of wholesalers and exporters in the study area. The short season of producer's supply of sesame

to the market leads to the involvement of so many agents in sesame marketing. Like brokers they do have other activities to perform and received predetermined commission.

Retailers: Retailers are those firms that purchase both sesame seed and sesame oil from wholesalers and oil milers for resale to local consumers.

Local consumers: Local consumers are the end users of both sesame seed and edible sesame oil. The following Figure indicates the various stages in sesame seeds value chain. This long supply chain will naturally reduce the benefit to be obtained by the producer; this in turn kills the incentive to produce more.

Figure-3. Sesame value chain map



Source: Own computation from survey result, 2018

ECX: The Ethiopian government is trying to create a mechanism having an efficient, transparent, fair and competent commodity marketing system within the country. Such an effort is the establishment of Ethiopian commodity exchange. ECX is expected to create market integrity through: introduction of viable products with certified grade and standards; membership based trading; enforcement of standardized terms and conditions for enforcement of contracts in accordance with trading rules.

Exporters: those are the final market chain actors in the national trade. They are highly concentrated at the central market and purchased sesame from the wholesalers and sometimes from the cooperatives based on the sated standard by the by ECX. They are allowed to buy sesame from wholesalers through auction by Ethiopian commodity exchange in Addis Ababa and export sesame to abroad country.

Non-Governmental Organizations: different NGOs operate in southwest of Ethiopia, working with clusters of farmers to promote improved livelihoods through promotion of improved technologies, linking farmers to markets through formation of groups and dissemination of market information, promotion of organic agricultural practices through farmer training and facilitation of rewarding for outstanding producers. The NGOs like AGP (Agricultural Growth Program) that work on improving rural livelihoods of farmers in the study area plays a great role by providing different agricultural inputs.

3.4. 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 4).

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 $\rho 21$(correlation between the choice for private trader and cooperative), $\rho 31$ (correlation between the choice for rural collector and private trader markets), $\rho 41$(correlation between the choice for private trader and consumer), $\rho 32$ (correlation between the choice for rural collector and cooperative markets) are negative and statistically significant at 1% and 10% level respectively and $\rho 43$ (correlation between the choice for rural collector and consumer markets) positive and statistically significant at 1% level (Table 4). This finding leads us to the conclusion that farmers delivering to the private trader market are less likely to deliver to cooperative market channel ($\rho 21$). Equally, those involved in rural collector market outlet are less likely to send their sesame to the private traders ($\rho 31$) (Table 4).

The simulation results also indicate that the marginal success probability for each equation (outlet choice decision) is reported below. The likelihood of choosing rural collector outlet is relatively low (19%) as compared to the probability of choosing consumer outlet (20%), cooperative outlet (59%) and private traders' outlet (66). This is a good evidence to suggest that availability of informal traders' 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 4).

Years of farming experiences: the likelihood of choosing traders 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 traders and cooperative market outlet, but decrease 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.* [17] who found that as households with a more number of year engagement in honey production and marketing are more likely to choose cooperatives outlet.

Household size: The likelihood of choosing traders outlet was 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 agree with the finding of Kassa, *et al.* [17] Farmers who have better family size chooses wholesaler market outlet relative to collector outlet.

Education level of the household head: The likelihood of choosing traders 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 was correspond with the findings of Riziki, *et al.* [18] and Shiferaw, *et al.* [19], 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.

Table-4. Determinant of sesame market outlet choice

	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)
Market distance	-.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)

Prdctd probability	0.66	0.59	0.20	0.19
Joint probability success			0.017	
Joint probability of failure			0.06	
Number of draw			10	
Observations			260	
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	-.090(.114)	1.00		
ρ_3	-.229(.125)*	-.353(.118)***	1.00	
ρ_4	-.288(.116)**	-.416(.111)***	.772(.065)***	1.00

Likelihood ratio test of $\rho_{21} = \rho_{31} = \rho_{41} = \rho_{32} = \rho_{42} = \rho_{43} = 0$

$\chi^2(6) = 67.98$ Prob > $\chi^2 = 0.000$

Note: Coefficient and standard errors in parentheses and ***, ** and * indicate statistical significance at 1, 5 and 10%, respectively.
Source: Own computation from survey result, 2018

Quantity supply: quantity of sesame supply was positively and significantly influence the likelihood of choosing traders 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 Fikiru, *et al.* [20] 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.* [21] 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 private traders 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 traders and cooperatives.

Cooperative membership: 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 [17] 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.

Participating in training: 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.

Land under sesame: 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: traders and cooperative relative to collector outlet. This result was in line with the finding of NuriLefebo [22] 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 the nearest market: proximity to nearest market is negatively associated with likelihood of choosing traders 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 traders and cooperative outlet become decrease. This is in line with the finding of Solomon, *et al.* [23]; 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.* [24], 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.

Major actors that involve in marketing of sesame are: Producers, Wholesalers, Rural collector, Cooperatives, Broker/Commission agents, Retailers, Local consumers, ECX, Exporters and Non-Governmental Organizations. 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 producers choice of market outlet.

- The concerning bodies like: District and Zone agriculture office, Mizan Tepi University, different NGO and other institution or organization should give due concerning toward strengthening farmers sesame cooperative and strengthening the financial capacity of cooperative improving accessibility of transport se rvice and developing infrastructure, improving farmers'knowledge through adult education as well as 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.

Availability of Supporting Data

The authors want to declare that they can submit the data at any time based on publisher's request. The datasets used and/or analyzed during the current study will be available from the authors on reasonable request.

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