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A study on determinants of sesame market supply (With reference to sesame farmers, Tigray Regional state, Ethiopia)

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Abstract
The specific objective of the study was to identify determinant factors that affect sesame market supply in Kafta Humera Werda, Tigray Regional state, Ethiopia. In order to acquire the relevant data for this study both primary and secondary data were used. Cross sectional data was collected from 388 sample respondents of the Kafta Humera Werda Tigray regional state using multistage sampling technique. Data were analyzed using multiple liner regressions model to arrive at conclusion. The result of the multiple regression model indicates that sesame market supply was significantly and positively affected by total land cultivated, quantity of sesame produced, access to extension service, yield per hector, formal educational level of household heads, family size aged 18 to 69 years old, oxen ownership, sesame production experience,market information, and access to credit service at 1 and 5 percent significance level respectively. On the other hand, distance to market significantly and negatively affected sesame supply to market at 5 percent significance level. Strategies that are targeted at providing farmers with adequate credit and other extension services, improving marketing infrastructures, offering farmers a fair price, building experience of farmers, establishing institutions that disseminate reliable market information improving farmer's linkage with cooperatives, while designing any marketing program are recommended to increase sesame market participation and marketed surplus in the study area. Policy makers should focus on these socio-economic and institutional factors influencing the farmer's market choice. This in turn may reduce food security problem and enhance income of the farmers. Since, land under sesame is a proxy measure of quantity of sesame produced the area used for sesame production is difficult to increase due to its limited resource. Therefore, it is better to increase the productivity of sesame. Adequate supply of improved varieties, controlling of disease and pests and use of optimum input should be applicable to increase the productivity of sesame and its supply to the market. Thus, the government and/or private sector players should train farmers on these areas. Training on production and post-harvest handling techniques could address this challenge. Economical support should be given to farmers through formal credit agencies. Strong extension intervention is vital to assist farmers in producing high quality sesame and increase production through consistent follow up, and keeping of farm records. In suggesting upgrading strategies to improve chain competitiveness and efficiency, productivity and quality are becoming more important for sesame farmers to compete in an increasingly competitive market. Therefore, these factors must be promoted by developing farmers' awareness about marketing and post-harvest handling, developing storage infrastructure and coordinating fragmented producers in to farmer cooperatives.

Keywords: value chain analysis, kafta humera werda

1. Introduction

1.1 Background of the Study

In many parts of the world, agriculture continues to play a central role in economic development and to be a key contributor to poverty reduction. Nevertheless, agriculture alone will not be sufficient to address the poverty and inequality that are so insidious in today's world. As a result, it is becoming increasingly crucial for policy makers to focus immediate attention on agro-industries. Such industries, established along efficient value chains, can increase considerably the rate and scope of industrial growth. In developing countries, a momentous amount of national funds are used to support agricultural production inputs – primarily seeds, fertilizers and irrigation systems. Traditionally, small attention has been paid to the value chains by which agricultural products reach final consumers and to the fundamental potential of such chains to generate value added and employment opportunities (UNIDO, 2009) [34].

Agriculture is fundamental to Africa's agenda, and efforts have made to link production with agribusiness for better growth in the sector. Now days, it earns an average of 24 per cent of its annual growth from its farmers and their crops value chains reveal common and well-known constraints, such as poor infrastructure; fragmented and risky markets; poorly functioning input markets; difficulties accessing land, water, and finance; and inadequate skills and technology. More enlightening, however, is the big differences across value chains (World Bank, 2013) [37].

Agriculture is the most important sector in Ethiopia which accounts for 46% of GDP, 80% of export value, and about 73% of employment. The sector still remains largely dominated by rain-fed subsistence farming by smallholders who cultivate an average land holding of less than a hectare. Although agriculture has a long history in the country's economy, development of the sector has been weighed down by a range of constrains which include land degradation, low technological inputs, weak institutions, and lack of appropriate and effective agricultural policies and strategies (Aklilu, 2015) [4].

Ethiopia adopted Agricultural Development Led Industrialization (ADLI) strategy in 2001. Understanding the role of agriculture as the source of all development endeavors, the government of Ethiopia designed agricultural development strategy known as Agricultural Development Lead Industrialization (ADLI, 2001); which considers agriculture as the engine of growth on explanation of its potentiality to linkages, surplus generation, potential market creation, provision of raw materials and foreign exchange earnings.

Porter (1985) [23, 28], has defined value as the amount that buyers are voluntarily agree to pay for what a firm provides, and he further prevailed that the "value chain" as the mix of generic value added activities operating within a firm activities that work seemly to provide value to customers. Furthermore, value chain is a concept that simply explained as the whole range of activities required to bring a product from the initial input-supply stage, through various stages of production, to its final market destination. The production stages includes a combination of physical transformation and the participation of different producers and services, and the chain includes the product's disposal after use (Kaplinsky and Morris 2000) [16].

According to Kaplinisky and Morris (2001) [17], agricultural value chain analysis is a dynamic approach that examines how markets and industries respond to changes in the domestic and international demand and supply for a commodity, technological change in production and marketing, and developments in organizational models, institutional arrangements or management techniques. The analysis should look at the value chain as a set of institutions and rules; as a set of activities involved in producing, processing, and distributing commodities; and as a set of actors involved in performing the value adding activities. Value chain analysis focuses on changes over time in the structure, conduct and performance of value chains, particularly in response to changes in market conditions, technologies and policies.

Value chain focuses on the opportunities and constraints presented by the form of global integration of production and trade in specific commodities. Kaplinsyk and Morris (2000) [16] have renowned two viewpoint of value chain analysis, heuristic and analytical construct. According to these authors, at its simplest level, value chain analysis maps the flow of goods and services up and down the chain. This form of value chain is a descriptive construct which provide a heuristic framework for the generation of data. The second view point of the value chain analysis is that recent development in value chain theorization have began to provide an investigative structure which make available important approaching into the determinants of global income distribution and discovery of effective policy measures to improve the tendency towards income inequality.

2. Statement of the Problem

Agriculture has been the major driver of economic growth and contributing to long-term food security in Ethiopia. The Government of Ethiopia is committed at allocating 15 to 17 percent of yearly expenditures to the sector; it covers 41 percent of gross domestic product (GDP), over 90 percent of export value and directly supports 85 percent of the populations' livelihoods (MoFED, 2015) [24]. It is also the sector that is given a widespread focus in the governments plan for growth of the economy as a whole.

A review of empirical studies by Dereje, (2007) [12]; Kaleb, (2008) [15] ands Dendena *et al*., (2009) [11] on crop and agro-industry value chain in Ethiopia indicates that the sector faces many challenges due to limited market outlets, limited efforts in market linkage activities and poor market information among actors. Similarly, Mamo (2009) [21] argued that small scale, dispersed and unorganized producers are unlikely to exploit market opportunities, as they cannot attain the necessary economies of scale and lack bargaining power in negotiating prices.

No empirical studies have been conducted on estimating the status of sesame value chain. Study on value chain could make sesame products attractive for high value market opportunities. To date, there are no empirical evidences on whether, and to what extent, sesame value chain and price transmissions are efficient, and whether sesame markets are integrated or not. Despite the efforts on the part of government and other stakeholders on enhancing sesame crop production and marketing, the success of sesame crop as an alternative to other crops is dependent on consumers' preference for the crop at local and international market. This demands to develop a clearer approach of understanding consumers' preferences of sesame crop which posed a strategic challenge to the current government's policy on the product.

Therefore, the value chain analysis for the sesame was conducted to reduce the information gap on the subject and to better understand improved strategies for reorienting value chain system for the benefit of value chain actors. To this effect, the present study focused on providing an in depth analysis of the value chain of sesame crop.

3. Objective of the Study

The objective of the study is to identify determinants of sesame market supply in Kafita Humera Werda, Tigray Regional State,Ethopia.

4. Research Methodology

4.1 Research Approach and Design

For the purpose of this study, the researcher used mixed methods approaches which are both quantitative and qualitative approach. It is believed that when mixed approaches were used gaining better understanding of phenomena will be realized in pragmatic way. Therefore, in order to address the objective of the study, both approaches were used. On the one side, adopting a mixed method approach enables one approach is to inform anther approach is to interpret the overall results. Cross sectional survey was used to collect data at a time.

4.2 Source of Data and Sampling Method

Both primary and secondary data are used. This study mainly rely on primary cross-sectional data collected using structured questionnaires from 388 sesame producer farmers selected using multistage sampling techniques out of which 374 were found complete and used for data analysis. Secondary data were compiled from related empirical studies, articles, books, etc.

4.3 Methods Data Analysis

Multiple liner regression model was used to analyze data of this study with the help of SPSS version 20.

4.3.1 The Regression Model and Hypothesis

Different researchers used regression model to study determinants of market supply using different variables. Few to mention (Bosena *et al*., 2008; Ayelech, 2011; Nuri, 2016; and Yimer, 2015) [9, 7, 26, 38] used multiple linear regression model to analyze factors affecting market supply of mango and avocado, cotton, and fruits, respectively. This model was chosen for a reason that the dependent variable i.e. quantity supplied is continuous (Gujarati, 2003). Following these researchers in this study, multiple linear regression model was used to analyze factors affecting farm level sesame supply to market in the study area.

Model Specification

The econometric model specification of the variables is as follows.

Sesame Market Supply =

$$\beta 0 + \beta 1x1 + \beta 2\, x2 + \beta 3\, x3 + \beta 4x4 + \beta 5x5 + \beta 6x6 + \beta 7x7 + \beta 8x8 + \beta 9x9 + \beta 10x10 + \beta 11x11 \text{----} + B14x14\epsilon$$

Where,

- Level of market participation = Quantity of sesame supply to market (the dependent variable)
- β_0= is a constant by a mathematical process called least square
- The value of $\beta 1, \beta 2, \beta 3, \beta 4$ are called the regression coefficient and are estimated from the study data.
- Xi = independent variables
- $\in$ = term error

4.3.2 Hypotheses of the study

Hypotheses are assumptions in which a researcher bases his investigation and on the basis of which a confirmation of the assumed conditions are tested and validated. The hypotheses of this research study have stated in the null hypotheses form as follows.

1. **H_O1:** There is no statistically significant relationship between total land cultivated and quantity of sesame supplied to market.
2. **H_O2:** There is no statistically significant relationship between formal education of household head and quantity of sesame supplied to market
3. **H_O3:** There is no statistically significant relationship between family size aged 18 to 69 years and quantity of sesame supplied to market
4. **H_O4:** There is no statistically significant relationship between oxen ownership and quantity of sesame supplied to market.
5. **H_O5:** There is no statistically significant relationship between distance to market and quantity of sesame supplied to market
6. **H_O6:** There is no statistically significant relationship between use of improved seeds and quantity of sesame supplied to market
7. **H_O7:** There is no statistically significant relationship between production experience and quantity of sesame supplied to market
8. **H_O8:** There is no statistically significant relationship between sesame volume produced and quantity of sesame supplied to market
9. **H_O9:** There is no statistically significant relationship between price of sesame 08 and quantity of sesame supplied to market
10. **H_O:10:** There is no statistically significant relationship between market information and quantity of sesame supplied to market
11. **H_O11:** There is no statistically significant relationship between access to credit and quantity of sesame supplied to market.
12. **H_O12:** There is no statistically significant relationship between access to extension service and quantity of sesame supplied to market
13. **H_O13:** There is no statistically significant relationship between yield per hector and quantity of sesame supplied to market.
14. **H_O14:** There is no statistically significant relationship between sex of household head and quantity of sesame supplied to market.

5. Tests of Measures and Assumptions

As clearly mentioned under objective section of this study, identifying factors that determine sesame supply to market was tested using multiple liner regression model. To this end, assumptions of multiple liner regressions were tested before running the regression analysis and all tests fit assumptions of the model. Multi-collinearity test between independent variables, the researcher has conducted using variance inflation factor and tolerance, test for model fitness, test for normality, linearity-using plots, Shapiro walk test, auto correction using durbin Watson test etc were conducted and fulfills all required assumptions to run regression analysis with the help of SPSS version 20.

6. OLS Regression Result on Determinants Sesame Market Supply

The empirical, OLS estimation result depicted in table 1.1 revealed the various factors that affect sesame market supply. According to the estimated result of OLS regression, majority (ten variables) variables affect sesame market supply positively and statistically and one variable affects sesame market supply negatively and statistically and three variables were found totally insignificant. Explanations on the significant variables are presented under result discussion.

Table 1: Determinants of Sesame Market Supply using OLS Regression(N=374)

Variables	Unstandardized coefficients		Standardized coefficients	t	P-value (Sig)
	B	Std.Error	Beta		
(Constant)	11.699	3.008		3.890	.000
Total Land Cultivated	.640*	.101	.493	6.345	.000
Formal Education	.950*	.372	.071	2.553	.011
Family size aged 18-69yeras	.270**	.124	.061	2.182	.030
Oxen Ownership	1.085**	.515	.059	2.106	.036
Distance to Market	-.034**	.016	-.061	-2.060	-.040
Use of Improved Seeds	.331	.542	.023	.611	.541
Production Experience	1.217**	.610	.075	1.995	.047
Sesame QTY Produced2009	.532*	.024	.692	22.609	.000
Sesame Seal Price2008	.001	.001	.025	.815	.416
Market Information	.264**	.122	.056	2.081	.028
Access to Credit	.002**	.001	.075	2.228	.026
Extension Service	.550*	.123	.139	4.421	.000
Yield Per Hector	.657*	.147	.130	4.465	.000
Sex of household head	.449	.372	.034	1.208	.228
R-squared	0.731				
Adjusted R-squared	0.720				
F-statistics	64.991				.000

***Source*:** SPSS output, 2017 Dependent Variable: Quantity of sesame Supplied to Market in 2009 Year
N= Number of Respondents Note: *, **, significant at 1%, and 5% respectively

Based on the regression analysis depicted in the above table 1.1, the p –value of F-test is statistically significant with means of at p-value of zero to three decimal places, the model is statistically significant. The p-value associated with the F value is very small (.000) and when compared with our alpha level of 0.05 we can conclude that the independent variables reliably predict the dependent variable. if the p-value is greater than 0.05, we would say that the group of independent variables do not show a significant relationship with the dependent variable, or the group of independent variables do not reliably predict the dependent variable.

The ability of each individual variable to predict the dependent variable is addressed in table 1.1 The R-square is. 731; this means that, 73.1 percent of the variability of quantity of sesame supplied to market is accounted for the variables in the model indicated above. The adjusted R-square as shown in table 1.1 indicates that 72 percent of quantity of sesame supplied to market is accounted by the model, even after taking in to account the number of predictor variables in the model.

7. Hypotheses Testing

Based on the regression analysis depicted under table 1.1 above the following hypotheses were tested in this study.

Hypotheses 1

There is no statistically significant relationship between total land cultivated and quantity of sesame supplied to market.

As observed from table 1.1 the coefficient of total land cultivated is significantly different from zero using beta value of =.493, t(degree of freedom)=6.345 N=374 at p –value of. 0.000 smaller than 0.01 which has statistically significant positive relationship with quantity of sesame supplied to market. Therefore, this result rejects the null hypotheses and accepted alternative hypotheses.

Hypotheses 2

There is no statistically significant relationship between formal education of household head and quantity of sesame supplied to market.

The regression result depicted in table 1.1 shows that, the coefficient of formal education status of household head is significantly different from zero using beta value of =.071, t=2.553 N=374; at p –value of 0.011 smaller than 0.05 which has statistically significant positive relationship with quantity of sesame supplied to market. As a result, we reject the null hypotheses and accepted alternative hypotheses.

Hypotheses 3

There is no statistically significant relationship between family size aged 18 to 69 and quantity of sesame supplied to market.

Table 1.1 indicates that, the coefficient of family size aged from 18 to 69 years old is significantly different from zero using beta value of =.061, t=2.182 N=374; at p –value of 0.030 smaller than 0.05 which has statistically significant positive relationship with quantity of sesame supplied to market.As a result, we reject the null hypotheses and accepted alternative hypotheses.

Hypotheses 4

There is no statistically significant relationship between oxen ownership and quantity of sesame supplied to market.

As shown in Table 1.1 above the coefficient of oxen ownership is significantly different from zero using beta value of =.059, t=2.106 N=374; at p –value of 0.036 is smaller than 0.05 which has statistically significant positive relationship with quantity of sesame supplied to market. Hence, we reject the null hypotheses and accepted alternative hypotheses.

Hypotheses 5

There is no statistically significant relationship between distance to market and quantity of sesame supplied to market.

As shown in Table 1.1 above that, the coefficient of distance to market is significantly different from zero using beta value

of =-.061, t= -2.060,N=374; at p –value of -0.040 smaller than 0.05 which has statistically significant negative relationship with quantity of sesame supplied to market. Therefore, we reject the null hypotheses and accepted alternative hypotheses.

Hypotheses 6

There is no statistically significant positive relationship between use of improved seeds and quantity of sesame supplied to market.

Table 1.1 shows that, the coefficient of use of improved seeds is significantly different from zero using beta value of =.023, t=.611 N=374 at p value 0.541 greater than 0.05. This indicates that there was no statistically significant relationship between quantity of sesame supplied to market and use of improved seeds. Therefore, we accept the null hypotheses and rejected the alternative hypotheses.

Hypotheses 7

There is no statistically significant positive relationship between production experience and quantity of sesame supplied to market.

Table 1.1 shows that, the coefficient of production experience is significantly different from zero using beta value of =.075, t=1.995 N=374 at p value.000 smaller than 0.05. This indicates that there is statistically significant relationship between quantity of sesame supplied to market and production experience. Therefore, we reject the null hypotheses and accept the alternative hypotheses.

Hypotheses 8

There is no statistically significant positive relationship between sesame volume produced and quantity of sesame supplied to market.

As shown in Table 1.1 above the coefficient of sesame volume produced is significantly different from zero using beta value of =.692, t=22.609 N=374; at p –value of 0.000 smaller than 0.01 which shows statistically significant positive relationship with quantity of sesame supplied to market. Therefore, we reject the null hypotheses and accepted alternative hypotheses.

Hypotheses 9

There is no statistically significant relationship between price of sesame 08 and quantity of sesame supplied to market.

Table 1.1 shows that, the coefficient of distance to market information is significantly different from zero using beta value of =.025, t=.815 N=374 at p value. 416 greater than 0.05. This indicates that there is no statistically significant relationship between quantity of sesame supplied to market and pervious year price of sesame 08. Therefore, we accept the null hypotheses and rejected the alternative hypotheses.

Hypotheses 10

There is no statistically significant relationship between market information and quantity of sesame supplied to market.

Table 1.1 shows that, the coefficient of distance to market information is significantly different from zero using beta value of =.056, t=2.081, N=374; at p –value of. 0.028 smaller than 0.05. This indicates that, there is statistically significant positive relationship between quantity of sesame supplied to market and market information. Therefore, we reject the null hypotheses and accepted alternative hypotheses.

Hypotheses 11

There is no statistically significant relationship between access to credit and quantity of sesame supplied to market.

Table 1.1 shows that, the coefficient of access to credit is significantly different from zero using beta value of =.075, t=2.228, N=374; at p –value 0.026 smaller than 0.05. This indicates that there is statistically significant relationship between quantity of sesame supplied to market and access to credit. Hence, we reject the null hypotheses and accepted alternative hypotheses.

Hypotheses 12

There is no statistically significant relationship between access to extension service and quantity of sesame supplied to market.

Table 1.1 shows that, the coefficient of access to extension service is significantly different from zero using beta value of =.139, t=4.421 N=374; at p –value 0.000 smaller than 0.01. This indicates that there is statistically significant relationship between quantity of sesame supplied to market and access to extension service. Therefore, we reject the null hypotheses and accepted alternative hypotheses.

Hypotheses 13

There is no statistically significant relationship between yield per hector and quantity of sesame supplied to market.

As shown in Table 1.1 above the coefficient of yield per hector is significantly different from zero using beta value of =.130, t=4.465, N=374 at p –value of 0.000 smaller than 0.01. This implies that, there is statistically significant positive relationship with quantity of sesame supplied to market. As a result, we reject the null hypotheses and accepted alternative hypothesis.

Hypotheses 14

There is no statistically significant relationship between Sex households head and quantity of sesame supplied to market.

The result depicted in table 1.1 indicate that the coefficient of sex of household head is significantly different from zero using beta value=.034, t=1.208, N=374; at p –value 0.228 greater than 0.05.This indicates that there is no statistically significant relationship between quantity of sesame supplied to market and sex of house hold head. Therefore, we accept the null hypotheses and rejected the alternative hypotheses.

8. Summary of Hypotheses Tested

The findings of variables used to identify and measure determinants of sesame market supply exhibited psychometric properties and their hypothesized relationship in the regression model is depicted below.

Table 2: Summary of Hypotheses Tested

Hypotheses	Association between variables	Significant	Decision	
			H_0	H_a
H1	TLC with QSSTM	Yes	Rejected	Accepted
H2	FED with QSSTM	Yes	Rejected	Accepted
H3	FMS with QSSTM	Yes	Rejected	Accepted
H4	OXX with QSSTM	Yes	Rejected	Accepted
H5	DTM with QSSTM	Yes	Rejected	Accepted
H6	UIMS with QSSTM	No	Accepted	Rejected
H7	PRDEXPwith QSSTM	Yes	Rejected	Accepted
H8	QTSPR with QSSTM	Yes	Rejected	Accepted
H9	SSPR08 with QSSTM	No	Accepted	Rejected
H10	MI with QSSTM	Yes	Rejected	Accepted
H11	ATC with QSSTM	Yes	Rejected	Accepted
H12	ATES with QSSTM	Yes	Rejected	Accepted
H13	PRPH with QSSTM	Yes	Rejected	Accepted
H14	SHH with QSSTM	No	Accepted	Rejected

***Source*:** Survey Result, 2017

Where; QTSSTM represents (Quantity of sesame supplied to market); TLC (Total land cultivated); FED (Formal education); FMS (Family size aged18-69 years); OXX (Oxen Ownership); DTM (Distance to Market); UIMS (Use of improved seeds); PRDEXP (Production Experience); QTSPR (Quantity of sesame Produced); SSPR08 (Selling Price of sesame 2008), MI (Market Information), ATC(Access to credit), AEXS(Access to extension services), PRPH(Productivity per hector), and SHH(Sex of household heads)**.**

9. Discussion on Regression Results (Determinant factors)

In presentation of this section, there is a discussion on fourteen variables stated above which were determinant factors that affect sesame market supply. Detailed discussions were conducted as per the result of the model and each determinant factor was analyzed indicating their relationship with sesame supplied to market.

With respect to total land cultivated for sesame production (TLC), the result of this study show that, positive and statistically significant relationship between total land cultivated for sesame production and quantity of sesame supplied to market which was depicted in the regression analysis in such a way that the coefficient of total land cultivated is significantly different from 0 using beta value. 493, degree of freedom (t) value 6.34 and its p-value. 000 is smaller than 0.05 (See table 1.1). The positive coefficient for total land cultivated implies that an increase in land cultivated to sesame production increases marketable supply of sesame. Increasing in the size of one hectare of land cultivated results in an increase in marketable supply of sesame by. 493 quintals, keeping other factors constant. In support of this finding, Kindie (2007) [19], Mengistu (2014) [22], indicated that the area of land allocated for sesame production in Metema and Humera District significantly and positively affected farm level marketable supply of sesame. Bosena (2008) [9] implies that land allocated to cotton production increases marketable supply of cotton by 8.43604 quintals keeping other factors constant.

As per the result of the regression analysis, there was positive and significant relationship between formal education status of house hold head and quantity of sesame supplied to market, because the coefficient of formal education status is significantly and positive from 0 using beta value 0.071, degree of freedom (t) value of 2.55 and its p-value 0.011 smaller than 0.05 (see table 1.1). This result shows that, on average, if sesame producer gets educated and increase one grade level, the amount of sesame supplied to the market increases by 0.071 quintals other things remain constant. The result further indicated that, education can improve household producing ability to acquire new idea in relation to market information and improved production which in turn enhanced productivity and thereby increased marketable supply of sesame. Education is believed to improve the knowledge of the household to increase the level of market participation. Human capital, represented by the household head's formal education is posited to increase a household's understanding of market dynamics and therefore improve decisions about the amount of output sold (Makhura *et al*., 2001) [20]. This result is in line with Holloway *et al*. (2000) observed that education had significant and positive effect on quantity of milk marketed in Ethiopian highlands. Aylech (2011) and Yimer (2015) [38] also explained that if avocado and fruit producer get educated, the amount of avocado and fruit supplied to the market increases respectively which suggests that education improves level of sales that affects the marketable surplus.

According to findings of the regression analysis, there was positive and significant relationship between family size of house hold aged 18 to 69 and quantity of sesame supplied to market, because the coefficient of family size is significantly and positively different from 0 using beta value 0.61, degree of freedom (t) value of 2.18 and its p-value 0.030 is smaller than 0.05(see table 1.1). This implies that, availability of family member aged 18 to 69 years old have a positive and significant effect on amount of sesame supplied to market. As one family member is added, sesame supplied to market increases by 0.61 quintals keeping other factors constant. This is because persons strive to produce and sell more sesame either by renting or doing effectively on own land; and this may be due to large family which may provide labor for planting, weeding and harvesting sesame so as to maximize production. This result is similar with findings of Yemer (2015) since production is a function of labour; family size serves as a form of family labour and compliments the effort

of the household heads on the farm. Thus, a larger family size increase Sesame production and then increases sesame market supply.

With regard to oxen ownership and quantity of sesame supplied to market, there was positive and significant relationship because the coefficient of oxen ownership is significantly and positively different from 0 beta value 0.59, degree of freedom (t) value of 2.10 and its p-value 0.036 (see table 1.1). The result shows that a unit increase in a number of oxen increases the participation decision of the household in sesame market by 0.59 quintals keeping other factors constant. This is mainly because land used for sesame production are relatively large as compared to that of other crop lands and thus producers require oxen power to cultivate sesame. The farmers who own larger number of oxen were produce grain crops on larger plots using their oxen and they have high tendency of sesame production. Hence, this finding is congruent with the study done by Abay (2007) [1] on vegetable market chain analysis found that there is direct relationship among number of oxen owned by households and onion market participation decision. In addition, findings of Kindie (2007) [19] on sesame market chain analysis and Addisu (2016) value chain analysis of vegetables showed that number of oxen owned was found to affect sesame marketed surplus positively which is similar with the findings of this study.

As depicted in table 1.1 quantity of sesame supplied to market and distance to central market, the finding of this study reveals that distance to market has statistically significant negative relationship with quantity of sesame supplied to market at beta coefficient value of -0.61,t value -2.06 and p-value -0.040.(see table 1.1). This implies that, if the proximity from the farm sesame producer house hold residence to market increases by one kilometre, the quantity of sesame supplied to the market decreases by 0.61 quintals other variables remain constant. The closer to the market the lesser would be the transportation cost and time spent so that it makes marketed surplus of sesame to be more. Finding of this research was found congruent with Ayelech (2011) [7] who found that distance to market caused marketed surplus of avocado to decline in Gomma W*oreda* and Key *et al*. (2000) [18]; Makhura *et al*. (2001) [20] find that distance to the nearest market negatively influences the level of output sold.

With regard to quantity of sesame supplied to market and production experience, the finding of this study shows that there is a positive and statistically significant relationship at beta coefficient value of 1.217, t value. 1.955 and p-value 0.047. (See table 1.1). For production experience of sesame producer, positive coefficient indicates that an increase in one year production experience of sesame increases marketable supply of sesame. This variable indicates that households who had one at least year sesame production experience can produce more amount of sesame had also supplied more amount of sesame to market than those who had less production experience. The value of the coefficient for sesame production experience implies that a one year production experience at sesame in an increase in farm level marketable supply of sesame by 1.217 quintals of sesame keeping other factors constant. This result is congruent Yimer (2015) [38] found that farming experience positively and significantly influenced the extent of market participation. Study conducted by Abay (2007) [1] indicated that as farmer's experience increases, tomato supplied to market increases in Fogera district.

The result of this analysis reveals that, there was statistically significant positive relationship with quantity of sesame supplied to market and volume of sesame produced at beta coefficient value of 0.692, t value 22.60 and p-value 0.000. (See table 1.1). This shows that, a one quintal increase in sesame production results in 0.692 quintals increase in amount of marketed supply, keeping other factors constant. These shows that the more the households produce, the more they supply to the market. This is due to the fact that sesame is cash crop product that almost all producers cultivate it with an objective to generate income from what he/she produced as there is consistency in the general expectation. In a similar way, previous studies by Omiti *et al*., (2009) [27]; Astewel (2010); Rehima and Dawit (2012) [31]; Adugna (2009) [3]; Ayelech (2011) [7]; Wolelaw (2005) [36] and Assefa (2009) [5], indicated that consistent increase in agricultural production positively and significantly increase the amount of marketed supply.

The result of this study also shows a positive and statistically significant relationship between quantity of sesame supplied to the market and access to market information which is significantly different from 0 using beta value of 0.56, degree of freedom (t) value of 2.08 and its p-value 0.028 (see table 1.1).This implies that, producers who has sesame related market information access will increase their supply to market by 0.56 quintals keeping other variables which affect quantity of sesame supply to market constant. This shows that access to market information like where to sell, how to sell, when to sell and price information plays a pivotal role in deciding the amount of sesame to be supplied to the market. Updated and current market information accessed through different sources like radio programs, telephone services, personal observations, from other traders or from extension agents encourages farmers to produce more. This leads to an increase in marketed supply of sesame. This finding is similar with findings of Muhammed (2011) [25], Abraham (2013) [2] and Nuri (2016) [26] which says that access to market information by household heads increases marketed supply of Teff, Potato and Enset significantly in Halaba especial woreda, Habro and Kombolcha district and Hadiya zone respectively.

As indicated in table 1.1, quantity of sesame supplied to market and access to credit service, the finding of this study shows that there is a positive and statistically significant relationship at beta coefficient value of 0.002, t value. 2.288 and p-value 0.026. (See table 1.1) For access to credit service positive coefficient indicates that when sesame producers had access to credit service it increases marketable supply of sesame. It shows that, households who had access to credit service can produced more amount of sesame and also supplied more amount of sesame to market than those who don't have access. The value of the coefficient for access to credit service implies that an increase in access to credit service per household can resulted in an increase in farm level marketable supply of sesame by 0.002 quintals, keeping other factors constant. A study conducted by Bradbear (2003) [10] states that in poor societies, lack of credit is a major constraint to everyone concerned with selling and buying honey.

Furthermore, previous studies done Tesfaye and Shiferaw (2001) [33] and Rahmeto (2007) [29], also shows that credit is one of the factors that affected the probability of adoption of improved varieties, quantity of fertilizer and haricot bean, respectively.

With regard to quantity of sesame supplied to market and access to extension service, the finding of this study shows that there is a positive and statistically significant relationship at beta coefficient value of 0.550, t value. 445 and p-value 0.000. (See table 1.1) For access to extension service related to sesame, positive coefficient indicates that when sesame grower get enough and time advisee related to sesame production an increase at sesame production will be realized which in turn increases marketable supply of sesame. Since this variable is a proxy variable for amount of sesame produced by households, it indicates that households who had access to extension service can supply more amount of sesame to market than those who don't have access to extension service produced less amount. The value of the coefficient for access to extension service of sesame implies that providing enough and time extension service for sesame growers can increase sesame production by 0.550 quintals farm level marketable supply of sesame, keeping other factors constant. This finding is in line with Holloway *et al*. (2000) observed that visits by an extension agent had significant and positive effect on quantity of milk marketed in Ethiopian highlands. Study conducted by Rehima (2007) showed that contact with extension agents positively influenced the red paper quantity supplied to market.

Finally, With regard to quantity of sesame supplied to market and productivity per hector, the finding of this study shows that there is a positive and statistically significant relationship at beta coefficient value of 0.62, t value. 421 and p-value 0.000. (See table 1.1). For productivity (yield) of sesame, positive coefficient indicates that an increase in productivity of sesame increases marketable supply of sesame. Since this variable is a proxy variable for amount of sesame produced by households, it indicates that households who had produced more amount of sesame had also supplied more amount of sesame to market than those who had produced less amount. The value of the coefficient for yield of sesame implies that an increase in yield of sesame by one quintal per hectare resulted in an increase in farm level marketable supply of sesame by 0.62 quintals keeping other factors constant. This result is congruent with Alemnew (2010) which states that total pepper production influenced the amount of marketed supply of pepper positively showing that farmers who produce more also supply more. Congruent with this research finding, previous studies done by, Bosena (2008) [9], Wolday (1994) [35], Wolelaw (2005) [36], Kindie (2007) [19], and Rehima (2007), shoows that the amount of cotton, grain, rice, sesame and red pepper productivity affected household marketable supply of each of the commodities significantly respectively.

10. Summary of Regression Results

The result of the multiple regression model also indicates that sesame market supply was significantly and positively affected by total land cultivated, quantity of sesame produced, access to extension service, yield per hector, educational level of household heads, family size aged 18 to 69 years old, oxen ownership, sesame production experience, sesame sells price of pervious year, market information, and access to credit service at 1 and 5 percent significance level respectively. On the other hand, distance to market significantly and negatively affected sesame supply to market at 5 percent significance level. Sex of respondents, use of improved seeds and previous year's sesame selling price was found insignificant. From this, we conclude that among fourteen variables used eleven variables determine sesame market supply and the remaining three variables were insignificant.

11. Suggestions

This study revealed that policy relevant variables having greatest impact on *sesame* supply market decision were total land cultivated, educational level of household heads, family size aged 18 to 69 years old, oxen ownership, sesame production experience, quantity of sesame produced, market information, access to credit service, access to extension service sesame productivity and distance to market.

Strategies that are targeted at providing farmers with adequate credit and other extension services, improving marketing infrastructures, offering farmers a fair price, building experience of farmers, establishing institutions that disseminate reliable market information improving farmer's linkage with cooperatives, while designing any marketing program are recommended to increase *sesame* market participation and marketed surplus in the study area.

Policy makers should focus on these socio-economic and institutional factors influencing the farmer's market choice. This in turn may reduce food security problem and enhance income of the farmers. Since, land under sesame is as a proxy measure of quantity of sesame produced. The area used for sesame production is difficult to increase due to its limited resource and it is better to increase the productivity of sesame. Adequate supply of improved varieties, controlling of disease and pests and use of optimum input should be applicable to increase the productivity of sesame and its supply to the market. Thus, the government and/or private sector players should train farmers on these areas. Training on production and post-harvest handling techniques could address this challenge. Economical support should be given to farmers through formal credit agencies. Strong extension intervention is vital to assist farmers in producing high quality *sesame* and increase production through consistent follow up, and keeping of farm records.

In suggesting upgrading strategies to improve chain competitiveness and efficiency, productivity and quality are becoming more important for *sesame* farmers to compete in an increasingly competitive market. Therefore, these factors must be promoted by developing farmers' awareness about marketing and post-harvest handling, developing storage infrastructure and coordinating fragmented producers in to farmer cooperatives.

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