

Nigerseed Value Chain Analysis: The Case of Toke-Kutaye District, West Showa Zone, Oromia Regional State, Ethiopia

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Abstract

The study was designed to analyze factors that affect marketable supply of nigerseed, and nigerseed market chain; and to estimate value addition and marketing margin distribution of actors in Toke-Kutaye district, Oromia Regional State. The data were collected from both primary and secondary sources. The primary data were collected from 148 producer and 37 other market chain actors. The result of the study showed that on average 2.67 and 2.55 quintals of nigerseed were produced and marketed per household, respectively. Nigerseed produce had four market outlets and seven channels with poor values addition before reaching to the final consumers. Out of the total produce 92.4% of nigerseed were marketed by producers. Nigerseed supply in the district is positively affected by education of household, land size for nigerseed farming, number of oxen owned, access to input and market information. Producers and traders got a profit share of 63.79% and 36.21 %, respectively. In all channels, producers' gross market margin and net market margin were higher, while in multipurpose farmers primary cooperatives was with the least values. The crop has potential to serve as sources of livelihood, and farmers were the major contributor in the value addition process with better profit share margin followed by processors. Therefore, policy aiming to strengthening cooperatives, facilitating inter-linkage of stakeholders, and supporting the local processors are recommended to speed up the nigerseed market chain in the district.

Keywords: Actors, Market Channel, Multiple Linear Regression, Market Margin, Nigerseed

1. INTRODUCTION

Ethiopia is the center and origins of several edible oil crops which has been grown in diverse agro ecology (UNDP, 2011). The dominant oilseeds grown in the country includes nigerseed, sesame, groundnut, rapeseed, safflower and linseed. Oilseeds contribute in the development of the rural economy, and it is the third major crops after cereal and pulses in terms of cultivated areas. Oilseed is a high value export product which ranks as the second foreign exchange earner product next to coffee (Eneyew, 2013). The oilseeds sector makes an important contribution to the Ethiopian economy, accounting for about 20% of the total foreign exchange earnings of the country (Lefebvre, 2012).

Even though, the country has greater potential to produce and export oil crops and its products as foreign currency earnings; the government of Ethiopia is still supplying palm oils from foreign countries by subsidizing its price, due to unaffordable cost of the locally processed oil. The country spends 40 to 50% of the export revenues of oilseeds on the imports of edible oil and has excellent opportunities to produce edible oil for domestic consumption and substitute imported edible oil (Wijnands *et al.*, 2009). To minimize those difficulties and challenges of the oil seed sector along its opportunity of highly demanded indigenous oil product: farmers, small-scale producers, traders, entrepreneurs and processors expected to create value (James, 2013). The knowledge gaps of the oil crop including inefficiency of the market system, poor agronomic practices, weak extension services, limited use of improved agricultural technologies, lack and/or absence of business oriented agricultural production system, limited or no access to market facilities contribute in low participation of the value chain actors (Fanta *et al.*, 2011).

Among the different types of locally refined edible oil seeds, nigerseed is generally preferred for its taste by consumers in the domestic market; these contribute the seed to be the most popular for cooking, and with great market potential in the country. Thus, there is a need to use a value chain approach to fully understand and resolve the problem of nigerseed production, processing and supply to the market. Hence, to understand factors that affect the supply of nigerseed in the study area and to gain viable upgrading of the production, processing and marketing of nigerseed; there should be value chain analysis at every stage of the value chain. Therefore, this study was designed to analyze factors that affect marketable supply, and market chain of nigerseed; and to estimate value addition and marketing margin distribution of actors in Toke Kutaye district of Oromia Regional state.

2. Research Methodology

2.1. Study Approach and Data Sources

In Toke-Kutaye District, nigerseed occupied 1359 hectares of land with a total production of 7,791.65 quintals (WAO, 2014); and the area and produce share were 16% and 43% in the zone, respectively (BFEDO, 2011). The district was chosen purposively because of its nigerseed production and potential. In the district, 18 *kebeles*

engaged in nigerseed production. Those *kebeles* were stratified in to high, medium and low production area based on their total production. Six *kebeles* (two from each stratum) were selected randomly for the study. Sample size determination was made using Yemane (1967) sampling formula with 92% confidence level. Simple random sampling technique was used to select the ultimate sample of households at each *kebele* proportionally. The primary data were collected from 148 producer and 37 other market chain actors. The primary and secondary data were collected formally by the method of individual interview using semi-structured interview schedule questionnaire; and focus group discussion (each focus group has eight members with seven male and one female) with using checklists.

Table 1: Household Sample Design

Study area	Sample <i>kebeles</i>	Total number of HHS			Sample household		
		Male	Female	Total	Male	Female	Total
	<i>Kucoo Gamoo</i>	56	4	60	7	1	8
<i>Toke-Kutaye</i>	<i>Mungo Babogalo</i>	60	8	68	8	1	9
	<i>Toke Mexi</i>	125	10	135	16	2	18
District	<i>Kolba Anchabi</i>	158	19	177	21	3	24
	<i>Toke Kombolcha</i>	182	25	207	23	4	27
	<i>Imalaa Dawe Ajoo</i>	416	51	467	55	7	62
	Total	997	117	1114	130	18	148

2.2. Data Analysis Procedure

Management and analysis of the data was done using Statistical computer package for social sciences (SPSS version 20) and STATA version 11. Descriptive and inferential statistics; and econometric analysis were used to analyze the data collected from respondents.

2.2.1. Model specification

Multiple linear regression models were fitted to generate information about the determinants of nigerseed supply. However, supply function does not necessarily indicate linearity, hence to determine the non linear relationship the dependent variables were estimated using logarithmic function as described by Gujarati (2003) i.e. $Y = f$ (inputs, formal education, area of nigerseed, accesses to extension and credit services, distance to market, etc) as model specification.

$$\text{Log}Y_i = \beta X_i + U_i$$

Where $\text{Log} Y_i$ = logarithm of market supply of nigerseed for the model

X_i = a vector of explanatory variable, and 'i' is 1, 2, 3... n

β = coefficient of i^{th} independent variable

U_i = unobserved disturbance term

Definition of variable used in the multiple linear regression models hypothesized as follow :-

Table 2: Definition of variables used in the empirical model

Variable	Description	Category	units / value
	Dependent variable		
LOGQS	Logarithm of quantity Supplied	Continuous	Quintal
	Independent Variables		
AGHH	Age of Household head	Continuous	Years +/-
EDHH	Education of household head	Discrete	Level of education +
SXHH	Sex Household head	Dummy	1 male, 0 if female +/-
TFSZ	Total Family size	Continuous	Number -/+
AEXS	Access to extension services	Dummy	1 for Yes, 0 for No +
ACMI	Access to Market Information	Dummy	1 for yes, 0 for No +
MCOP	Membership to any Cooperative	Dummy	1 for yes, 0 for No +
ACRE	Access Credit	Dummy	1 for Yes 0 for No +
LSNF	Land used for nigerseed farming	Continuous	Hectares +
NOXO	Number of oxen owned	Continuous	Number +
DFMC	Distance from market center	Continuous	Kilometer -
DFMR	Distance from main road	Continuous	Kilometer -
AITE	Access to input type	Dummy	1 for yes, 0 for no +
TSAL	Time of sales	Category	Quarter of sales +/-

2.2.2. Value addition and marketing margin performance measurement

According to Gereffi, (1999) profit or value addition and price markups are indications of income shares across value chain actors. Mathematically to calculate the value added or profit margin of the product is the difference between the selling price and material and handling costs of the product; and distribution by each value chain actors in the market and decomposing for each actor to get approximations of each value-added share. Marketing

margin was determined as described by Muhammed (2011) and Abraham (2013).

$$PS = \frac{Pp}{Cp} = 1 - \frac{MM}{Cp} \cdot 100 \dots\dots\dots (1)$$

Where: PS= Producer's share

Pp= Producer's price

Cp = Consumer price

MM = marketing margin

The above equation tells us that a higher marketing margin, diminishes producers share and vice versa. It also provides an indication of welfare distribution among production and marketing agents.

$$GMM = \text{Consumer price} - \text{farmers price} \dots\dots\dots (2)$$

$$TGMM = \frac{\text{Consumer's price} - \text{farmer's price}}{\text{Consumer's price}} * 100 \dots\dots\dots (3)$$

$$GMMF = \frac{\text{Price paid by the Consumer} - \text{gross market margin}}{\text{price paid by the end user}} * 100 \dots\dots\dots (4)$$

Where GMM: Gross marketing margin

TGMM: Total Gross marketing margin

GMMF: Farmer's gross marketing margin

To find the benefit share of each actor the same concept was applied with some adjustments. Marketing margin at a given stage 'i' (GMM_i) was computed as:

$$GMM_i = \frac{SP_i - PP_i}{TGMM} * 100 \dots\dots\dots (5)$$

Where: SP_i=selling price at ith link

PP_i=purchase price at ith link.

$$NMM = \frac{\text{Gross market margin} - \text{Market cost}}{\text{Consumer's price}} * 100 \dots\dots\dots (6)$$

$$TGPM = TGMM - TOE \dots\dots\dots (7)$$

Where, TGPM is total gross profit margin, TGMM is the total gross marketing margin and TOE is total operating expense.

3. Result and Discussion

3.1. Determinant of nigerseed marketable supply

During the study 14 explanatory variables were hypothesized to determine the household level marketable supply of nigerseed; five of them found to significantly and positively affecting the marketable supply of nigerseed product (Table 2 & Table 3). Education of household, land size for nigerseed and Number of oxen owned were positively and significantly determined marketable supply of nigerseed at 1% significance level. The result confirmed that, as education status of the household, land size of nigerseed, and number of oxen owned increased by one level, the marketable supply of nigerseed increases by 17%, 88.9%, and 4.89% respectively. Kindie (2007) also found that education status of the household, land size, and number of oxen owned by household significantly and positively affected farm level marketable supply of sesame in Metema District. Similarly, access to input and market information determined positively and significantly the marketable supply of nigerseed at 5% and 1% significance levels, respectively. The positive and significant relation between the variables indicated that as access to input and market information increased by one, the marketable supply of nigerseed increases by 10.6% and 43.7%, respectively. This is in line with Rehima, (2006) and Mohammed (2011) who illustrated access to input and market information by farming households increase marketable supply of teff and paper in Halaba special and Siltie districts, respectively.

Table 3: Determinant of nigerseed marketable supply

Log QS	Coef.	Robust Std. Err.	T	P > t
SXHH	.0402435	.0442989	0.91	0.365
AGHH	.0010541	.0015446	0.68	0.496
TFSZ	-.0031777	.0074208	-0.43	0.669
EDHH	.170609	.0345956	4.93 ***	0.000
DFMC	.0283315	.0197339	1.44	0.153
DFMR	-.0042725	.0050234	-0.85	0.397
LSNF	.8893191	.1142953	7.78 ***	0.000
NOXO	.0489502	.017344	2.82 ***	0.006
AITE	.1064532	.0525068	1.66 **	0.045
ACRE	.0468208	.0524771	0.89	0.374
AEXS	-.0676497	.0360337	-1.88	0.163
TSAL	-.0069533	.0083535	-0.83	0.407
ACMI	.4375881	.0519755	8.42 ***	0.000
MCOP	.0299099	.0361293	0.83	0.409
Cons	-1.262201	.2184072	-5.78***	0.000
R ²				0.9237
F				0.0000 ***
N				148

Note: Dependent variable is the amount of nigerseed supplied in quintal. ***and** are statistically significant at 1% and 5%, respectively.

3.2. Marketing margin and profit share of actors

The marketing margin and profit share of a single longest channel showed the distribution of margin and profit among various actors as nigerseed produce and its processed products moved in the chain based on the average purchase and sales price of particular actors are taken in that marketing channel (Table 4).

In the district, on average 2.67qt and 2.55qt of yield were produced and marketed per household, respectively which shows the crop was a market oriented commodity. All of the nigerseed value chain actors' added value to the product as the product passes from one actor to another. A margin share of producers and traders are 57.83% and 42.17%, respectively. Producers added 63.79% of the total value; while cooperatives, wholesalers, processors and retailers are responsible for 5.1%, 6.75%, 16.4% and 7.93%, respectively.

Table 4: Nigerseed marketing costs and benefit shares of actors

Items (Birr/Qt)	Producer	Cooperatives	Wholesalers	Processor	Retailer (Birr/lit)	Horizontal sum
Purchase Prices	---	1810	1990	2200	2636	8636
Production cost	493	--	--	---	----	493
Processing cost	---	---	---	83.76	---	83.76
Marketing cost						
Labor	6	22.85	17.5	8.4	16	70.75
Packaging material	12	12	12	2	14	52
Transportation	10	40	40	---	25	115
Overhead cost	1	2	2.45	2.99	1.12	9.56
Tax	-	---	1.655	7.54	1.76	10.95
Total marketing cost	29	76.85	73.6	20.93	57.88	255.27
Total Cost	522	1886.85	2063.6	2304.69	2693.88	9471.02
Sale price	1810	1990	2200	2636	2854	11490
Market margin	1317	180	210	352.24	218	2277.24
% share of margin	57.83	7.9	9.22	15.46	9.57	100
Profit margin/Birr/	1288	103.15	136.4	331.31	160.12	2018.98
% share of profit	63.79	5.1	6.75	16.4	7.93	100
Profit in Birr per total cost	2.46	1.34	1.85	3.19	2.76	

Source: Survey result, 2015; (1USD≈~21 birr); Qt= quintal

3.3. Marketing channel of Nigerseed

Respondents' survey result revealed that 408.6qt of nigerseed was produced from 74.76ha of land. Of these produce 377.5qt (92.4%) and 31.1qt (7.6%) were marketable supply and used for consumption, respectively. The

nigerseed value chain actors were dependent on each other in marketing, value additions and flow of the product from its production to end consumption. Seven marketing channels were identified for nigerseed value chain and its products in the study area (Fig. 1). The channels mainly depend on nigerseed, nigerseed oil and oil cakes; as a result, 44.5% (168qt) produce was consumed in the district; while 55.5% (209.5qt) of the produce was outrun the district. The volume of production that distributed among the actors illustrated below (Fig. 1).

- I. Producer → Consumer (12qt)
- II. Producer → Cooperatives → Processors → Retailer → Consumer (12.5qt)
- III. Producer → Cooperatives → Wholesalers → Processors → Retailer → Consumer (7.2qt)
- IV. Producer → Wholesalers → Processors → Consumer (46.8qt)
- V. Producer → Wholesalers → Processors → Retailer → Consumer (57.2qt)
- VI. Producer → Processors → Consumer (32.4qt)
- VII. Producer → Wholesalers → Regional trader (209.5qt)

Fig 1: Market channel of nigerseed

3.4. Marketing margins of Nigerseed in different channels

Marketing margins of nigerseed in the different channels for each group of market players are given below in (Table 5). GMMpd, GMMcoop, GMMws, GMMpro and GMMrt are gross marketing margins of producers, cooperatives, wholesalers, processors and retailers, respectively. NMMcop, NMMws, NMMpro and NMMrt are net marketing margins of cooperatives, wholesalers, producer, and retailers, respectively. The total gross marketing margin was the highest in channel V which was about 39.4%; and the lowest at channel VI (21.5%). In all channels, producer's gross market margin was the highest value over the other actors. Relatively, wholesalers, processors and retailers got the highest gross marketing margin in channel IV, VI and V, respectively; whereas cooperatives has got the lowest marketing margin in channel II. Without thinking channel I producer's share (GMMp) was highest 71.65% (1102 Birr) per quintal from the total actor price in channel VI; because farmers directly sold their produce to processor without involvement of cooperatives and wholesalers. NMM of processors were the highest at channels VI 23.6% (331.3Birr) per quintal because of they directly purchased from producers and also got the highest profit among traders. This indicates that next to producers; processors add more values than the rest actors by changing the form of the product in each channel. Additionally, survey result indicated that producer's production and marketing cost was low; since neither fertilizer nor herbicides or weeding cost with a frequency of one or two ploughing of the land which was limits production cost, and got more profit share among other actors.

Table 5: Nigerseed marketing costs and benefit shares of actors across different channels

Actors	Items	Market channel					
		I	II	III	IV	V	VI
Producer	TGMM	-	30.5	36.6	33.6	39.4	21.5
	Sale price(Birr)	1872	1810	1810	1531	1531	1595
	Production cost (Birr)	493	493	493	493	493	493
	Market cost(Birr)	29	29	29	29	29	29
	GMM (Birr)	1379	1317	1317	1038	1038	1102
	GMM (%)	100	62.3	55.8	57.2	51.1	71.65
	NMM (Birr)	1350	1288	1288	1009	1009	1073
	NMM (%)	100	69.9	63.79	62.8	57.1	76.4
Cooperative	Purchase price (Birr)	-	1810	1810	-	-	-
	Market Cost (Birr)	-	76.85	76.85	-	-	-
	Selling price(Birr)	-	1950	1990	-	-	-
	GMMcoop (Birr)	-	140	180	-	-	-
	GMM (%)	-	6.6	7.6	-	-	-
	NMM (Birr)	-	63.15	103.15	-	-	-
	NMM (%)	-	3.4	5.1	-	-	-
Wholesaler	Purchase price (Birr)	-	-	1990	1531	1531	-
	Market Cost(Birr)	-	-	73.6	73.6	73.6	-
	Selling price(Birr)	-	-	2200	1870	1780	-
	GMMws (Birr)	-	-	210	339	249	-
	GMM (%)	-	-	8.89	18.7	12.3	-
	NMM (Birr)	-	-	136.4	265.4	175.4	-
	NMM (%)	-	-	6.75	16.5	9.9	-
Processor	Purchase price (Birr)	-	1950	2200	1870	1780	1595
	Market Cost(Birr)	-	104.7	104.7	104.7	104.7	104.7
	Selling price(Birr)	-	2386	2636	2306	2216	2031
	GMMpro (Birr)	-	436	436	436	436	436
	GMM (%)	-	20.65	18.5	24	21.5	28.34
	NMM (Birr)	-	331.3	331.3	331.3	331.3	331.3
Retailer	NMM (%)	-	17.9	16.4	20.6	18.76	23.6
	Purchase price (Birr)	-	2386	2636	-	2216	-
	Market Cost(Birr)	-	57.9	57.9	-	57.9	-
	Selling price(Birr)	-	2604	2854	-	2524	-
	GMMrt (Birr)	-	218	218	-	308	-
	GMM (%)	-	10.3	9.2	-	15.2	-
	NMM (Birr)	-	160.1	160.1	-	250.1	-
	NMM (%)	-	8.7	7.9	-	14.2	-
	TGMM(Birr)	1379	2111	2361	1813	2031	1538
TNMM(Birr)	1350	1842.5	2018.95	1605.7	1765.8	1404.3	

Source: Survey result, 2015

4. Conclusion and Recommendation

Nigerseed is a strategic crop for the livelihood of many farmers, and for market actors in the district it is a potential cash crop, and the marketable supply of nigerseed in the survey year was 92.4 %. Nigerseed supply in the district is positively affected by education of household, land size for nigerseed farming, number of oxen owned, access to input and market information. Therefore, these factors must be considered in order to increase the amount of nigerseed production and marketable supply. Nigerseed marketable supply in this study area passes through several chain actors which include Cooperatives, wholesalers, processors and retailers. From the total produce 55.5% of the crop got away from the district and sold to regional exporting and milling market. About 83.2% of nigerseed produce in the study area was accommodated by wholesalers. The total gross marketing margin is the highest in channel V (39.4%) and lowest at channel VI (21.5%). In contrast to others, channel VI was the shortest; and may reduce transaction cost, and generated more return for actors and benefit to end consumers. Hence, cooperatives must be equipped with knowledge, accountability and build vertical as well as horizontal linkages among unions and others cooperatives to achieve motto of cooperatives. In addition to these, oil millers must be introducing contract farming arrangements with farmers to sustain the production and supply of nigerseed.

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