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PERFORMANCE OF SOYBEAN MARKETING IN EMBU, THARAKA NITHI AND MERU COUNTIES, KENYA

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ABSTRACT

Current demand for soybean in Kenya exceeds supply despite numerous efforts by the government to increase production. Soybean farmers are faced with the difficulty in accessing the market reason for their reluctance in producing. Little is known about the soybean market in the central highlands of Kenya. This study was carried out with the aim to assess the structure conduct and performance of soybean markets in EmbuTharaka-Nithi and Meru Counties. Key informant interviews were carried out among soybean farmers' groups, Ministry of Agriculture Livestock and Fisheries and soybean processing companies. A structured questionnaire was administered to processors, wholesalers, retailers and assemblers of soybean. Data was collected mainly on characteristics of respondents and marketing information. The collected data were used to calculate Herfindahl Hirschman Index (HHI), gross margins, marketing margin, and marketing efficiency. The results of the study showed that there were eight important marketing channels with channel 1 being the most efficient followed by channel 7, 3, 8, 4, 2, 6 and 5 respectively. The HHI showed that wholesalers were competitive (0.0997); retailers were relatively competitive (0.1701) while processors indicated an oligopolistic market structure with an HHI index of 0.18. Farmers groups, wholesalers and assemblers sold their soybean to processors at a fixed price (60ksh) given by the processors. Quantities traded were low with an average of 333.3kg for wholesalers, 793.33kg for assemblers and 47kg for retailers. There were no trader associations in the study area even though farmers engaged in group marketing. The study concluded that Constraints to marketing by farmers included low prices, lack of processing equipment's, inadequate marketing arrangements, and high cost of processing.

KEYWORDS: *Soybean, Structure, Conduct, Market Performance, Farmers*

1.0 INTRODUCTION:

Soybean *(Glycine Max)* is one of the fastest growing agricultural crops over the last twenty years due to its high protein content. It is expanding at a rate of 8% per year and growing in over 85 countries on a total of almost 100 million hectares (Thuita *et al.,* 2018*)*. However, in Africa, the trend is different. In Africa since 1970, per capita supply of soybean is estimated to be falling by an average of 0.3% per year (Murage *et al.*, 2019). This can be attributed to inadequate production and marketing systems that limit yield growth at the farm level and also falling real incomes. Trevor *et al.,*(2015) suggest that in other for this trend of falling production to be reversed in Africa; it will require a collaborative action among the actors and this should be based on information that is reliable and a joint effort between the public sectors and private sector(Wathiru, 2018).

In Kenya, soybean production remains low averaging between 50000MT-120000MT, metric tons (MT) yearly (Mohamedkheir *et al.,* 2018). The industrial demand for soybean products however has continued to grow in Kenya from roughly 150.000MT in 2008 to 220.000MT in 2016(Grüter, 2018). Many efforts have been put in place to improve on the production and productivity of soybean in Kenya. In the 80s, the German Agency for Technical Cooperation (GTZ) project and United Nations Industrial Development Organization (UNIDO) were introduced to improve on the production of soybean in the Kenya. In addition, the development of the soybean sector through the Alliance of the Green Revolution (AGRA) funded soybean and climbing beans project in the central highlands and also the Kenya Agricultural Marketing Strategy (2011-2016), emphasized soybean production and productivity (Matusso *et al.,* 2014,Murithi *et al.,* 2016, Mohamedkheir *et al.*, 2018). All these initiatives demonstrate that the Kenyan Government efforts to harmonize production and productivityof soybean in the country. This is important because no matter how many factors are introduced into the process of commercializing soybean, the market will always be the final adjudicator (Ayele*et al.,* 2017). Sound agriculture markets are of fundamental significance as they ensure fair returns to all market participants,

from producers to the final consumer. Well-functioning markets provide remunerative prices to market participants and boost their efforts for increasing and sustaining agricultural production and marketing (Bakari *et al.,* 2020).

Despite government efforts to develop the productivity of soybean, local producers and traders, in central highland of Kenya are faced with unfavorable market conditions such as information asymmetry, lack of access to markets and competition from neighboring countries such as (Uganda Murage *et al.,* 2019). Many studies have been carried out concerning, production and high yielding varieties of soybean (Keino *et al.,* 2015). However, there is little knowledge on the marketing of soybean and more precisely on the structure, conduct and performance of the soybean markets in the central highlands of Kenya. Improving the structure and performance of agricultural markets in Kenya can make an important contribution to increasing income and reducing poverty by enabling smallholder to use the opportunity available for improving the marketing of their produce. As concerns this background, the study examined the structure conduct and performance of soybean marketing in Embu, Tharaka-Nithi and Meru and also the challenges and opportunities faced by traders in the central highland of Kenya.Several studies have been carried on structure conduct and performance in agriculture. Stephan *et al.,* (2017) carried out a study to analyze structure, conduct and performance of market for cabbage. The study collected data using the convenient sampling technique. Four vegetable seed companies were selected based on the higher market sales volume. Herschman-Herfindal index model was used for analyzing the market structure. To analyze the market conduct and performance, descriptive statistics were used. The Herschman-Herfindal index, was use to describe the market structure. Results of the Herschman-Herfindal index show that there were no easy ways for new firms to enter market. The promotional activities of different vegetables seeds companies were calculated by percentages. Each company was ranked on 1 to 5 scales. A comparison on individual parameter was done and the overall performance of each of the company was calculated with help of a grid. The study indicated that, the company had employed agricultural graduates in the district who had created good relationship with the dealers, nurserymen and vendors in the market. The overall performance of Syngenta seeds was topmost, followed by Seminis seeds, Mahyco seeds and Nunhems seeds.

(Nzima & Dzanja, 2015) assessed the efficiency of soybean markets in Malawi using structure, conduct and performance approach. Using time series price data, the spatially distinct soybean markets were also examined. The results showed five profitable marketing channels with minimal value addition. Most of the marketing channels are inefficient. Quantity of seed used is the significant factor affecting soybean production. The markets are weakly integrated and segmented with a few sellers. Girei *et al.,* (2013) conducted a study to assess the problems affecting structure, conduct and performance of cowpea marketing in Adamawa State, Nigeria. The finding indicated that, inadequate capital, pest infestation, and low profit, high cost of transportation, bad road network, storage, high taxes, inadequate market information and lack of standard were the problem militating against cowpea marketing in the study area.

2.0 MATERIALS AND METHOD

2.1 Description of the study Area

The study was undertaken in three sites; Meru County, TharakaNithi County and Embu County in the central high lands of Kenya. These counties were purposively chosen because they are the counties where soybean is highly cultivated in this region. In Embu County Mbeere South and Manyatta were chosen, Tharaka and Maara for TharakaNithi and for Meru, Imenti South and Tigania East.

Embu County borders TharakaNithi County to the North, Kitui to the East, Machakos to the South, Murang'a to the South West, Kirinyaga to the West, and Meru to the North West. The county has an approximated population of 516,212 and covers an area of 2,818 Km2 and lies at an altitude of approximately 1480 metres above sea level. The monthly average temperatures range between 140C and 250C. The soils in Embu sub counties are mainly humicnitisols derived from basic volcanic rocks. Soils in Mbeere are nitro rhodicferrassols (Jaetzold et al., 2006). The main food crops grown include; maize, beans, yams, cassava, millet, sorghum, bananas and arrowroots among others.

Meru County borders Isiolo County to the North and North East, Tharaka County to the South West, Nyeri County to the South West and Laikipia County to the West. It has a total population of 1,356,301; 320,616 Households and covers an area of 6,936 .9km2. The soils in Imenti sub counties are HumicNitisols while in other parts of the county they are Ferrasols and Luvisols. Temperatures range from a minimum of 16°C to a maximum of 23°C. The rainfall ranges between 500mm and 2600mm per annum(Matusso *et al.*, 2014). The main food crops grown include; maize, beans, yams, cassava, millet, sorghum and bananas. Cash crops include Miraa(khat), Coffee and Tea. Livestock keeping is also practised and includes cows, goats, sheep and chicken (Murage*et al.,*2019).

Tharaka-Nithi County borders Meru County to the North and North East, Kitui County to the East and South East, Embu County to the South and South West and covers an area of 2,638.8 Km 2. The County lies between latitude 000 07' and 000 26' South and between longitudes 370 19' and 370 46' East. According to Murage *et al.,* (2019) the soils are mainly humicNitisols in Meru south and Maara while in Tharaka the soils are mollicAndosols and eutricNitisols. Annual mean temperatures range from a minimum

of 18°C to a maximum of 24°C, and rainfall pattern is bimodal with the long rains beginning March and end in May while short rains start in October and end in December ranging between 1200mm to 1400mm annually. In the Tharaka sub counties the rainfall ranges between 500mm to 1000mm (Matusso *et al.,* 2014).

2.2 Sampling Procedure and Data Collection

The sample for this study consisted of various stake holders in the soybean value chain (Table 1). In order to ensure a reasonable representation of retailers across the study area, 9 markets were purposely sampled. A sampling frame was then developed from the sampled markets and contributed in the drawing of a random sample of retailers. A sample of 15 wholesalers,16 processors 16 farmer groups, 3 people from MoALF, 4 people from the SOCO project, 1 person representing FAO and 1 person from soybean processing company (BIDCO) were also sampled. A total of 86 retailers were sampled from a frame of 284 retailers using the formula below.

$$n = \frac{N}{1+Ne^2}.$$

$$n = \frac{284}{1+284\ (.09)^2}. = 86$$

Table 1: Method of sampling the actors and number sampled.

Actors	Method of sampling	Number sampled
Retailers	Simple random sampling	86
Wholesalers	Snowball sampling	15
Processors	Snowball sampling	16
Collectors	Purposive sampling	3
Total		**120**
Farmer groups	Purposive sampling	16
Ministry of Agriculture Livestock and Fisheries	Purposive sampling	3
Projects concerned with soybean in the study area	Purposive sampling	5

Source:*Field Survey 2018*

2.3 Data management and analysis

The data collected from the traders, farmers and other actors were analyzed with the help of Herfindahl Hirschman Index (HHI), gross margin analysis, marketing margin, marketing efficiency analysis, and descriptive statistics. Market structure was determined by looking at the conditions of entry and exit in the market sources of soybean and by also assessing market concentrations using HHI. A flow chat was used to illustrate the different channels through which soybean goes through from the farmer to reach the final consumer.

Market concentration was calculated using HHI using the formula below:

$$\sum_{i=n}^{n} MS^2 \quad \ldots\ldots 1$$

Where: MS_i is the Market Share of seller; and n is the number of sellers in the market. The market share is calculated based on quantities of soybean handled by each seller as follows:

$$MSi\ \frac{Vi}{\sum_{i=1}^{n} Vi} \quad \ldots\ldots 2$$

Vi is the quantity of soybean handled by seller i (in kg); and ∑Vi is the total quantity of soybean handled by sellers in the market (in kg)

The conduct of the market was analyzed by describing the buying and selling practices in the three counties, advertising and sales promotion strategies, degree of price collusion, and differentiating products.

Performance was assessed by calculating Gross Margin analysis, Marketing Efficiency and Marketing Margin.

$$\textit{Total Gross Marketing Margin} = \left(\frac{\text{retail price} - \text{purchase price}}{\text{retail price}}\right) \text{X } 100 \quad \ldots\ldots 3$$

$$\textit{Marketing margin} = \textit{selling price} - \textit{total cost price} \quad \ldots\ldots 4$$

Marketing efficiency index was used to determine marketing efficiency and is the net price ratio farmers perceived to the total marketing cost in addition to total margin as calculated follows:

$$\text{MEI} = \frac{NP}{NM+MC} \quad \ldots\ldots 5$$

Where MEI is the Marketing Efficiency Index; NP is the Net Price received by the farmers; MM is the Total Net Marketing Margin (for other actors in the chain); and MC is the Total Marketing Cost incurred by the actors in the chain.

3.0 RESULTS AND DISCUSSIONS

3.1 Marketing channels in Embu, Tharaka-Nithi and Meru

Marketing channels refers to the sequence of intermediaries through which a product passes from producers to consumers. Marketing channels provide a systematic knowledge of the flow of the goods and services from their origin (producer) to the final consumer(Mendoza, 1995,Giroh *et al.,* 2010, Girei, & Salamatu, 2015, Stephan *et al.,* 2017,Syamsurijal*et al.,* 2020)**.** This study found out that there were eight different channels through which soybean passed from the producer to the consumer in Embu, Tharaki-Nithi and Meru counties in the central high lands of Kenya (figure 1).

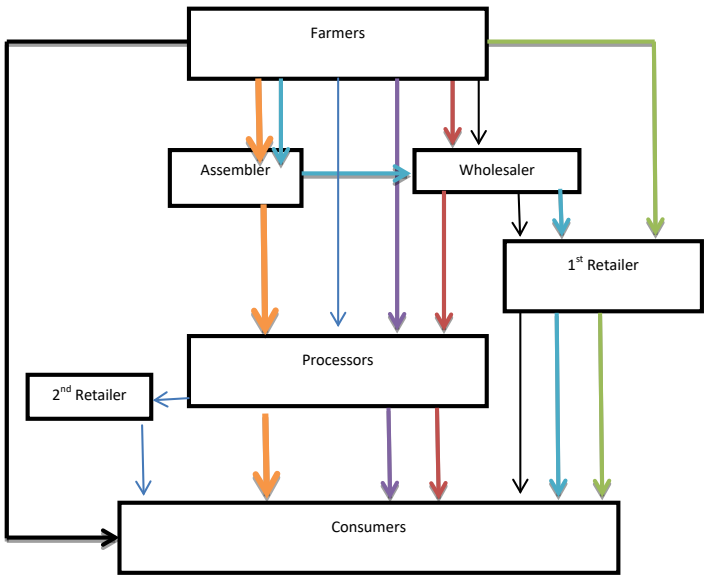

Figure 1: Market channels of soybean in the study sites Various Channels of soybean flow from farmer to the final consumer in the central highlands of Kenya 2018

Channel 1.Farmer ……consumer

Channel 2 Farmer ……assembler…….processor……consumer

Channel 3 Farmer….assembler….wholesaler….retailer…....….consumer

Channel 4 Farmer…….processor……2nd retailer……...…..consumer

Channel 5 Farmer……..processor……consumer

Channel 6 Farmer……wholesaler……..processor……..consumer

Channel 7 Farmer…….wholesaler……retailer……consumer

Channel 8 Farmer…….....retailer……...……consumer

Channel one was the shortest where soybean passed directly from the farmer to the final consumer. This was mostly done by farmers with very little quantities where by the cost of taking it to the assembler or whole seller was considered very high. These farmers in most cases knew who they are going to sell to and the consumers were mostly around their neighborhood.

Channel two passes through the assembler, processor then to final consumer. This channel was common in the three counties. However, it was highly practiced in Meru County because most farmers in this county were not aware of ways of how to process soybean to soy flour or soy drink for home consumption.

Channel three moves from the farmer to the assembler to wholesalers to the retailer and then to the consumer. This channel was common among farmers with little quantities, less than 10kg of unprocessed soybean. The farmers involved in this channel were not also aware of ways to process their soybean for home consumption. This explains why one farmer assembles the soybean and also why the farmers bear the cost of transportation to the assembler. The assembler sells to wholesalers because of the increase cost involved due to assembling of little quantities and can charge higher prices. In addition, the processors will not want to pay for the others cost involved in assembling the soybean hence not profitable for assemblers to sell to processors.

The fourth channel passes from the farmer to the processor then the second traders who are mostly small shops that retail the processed soybean to the final consumer. The farmers who sell directly to the processors are larger scale farmers with at least 45kg of soybean so they can cover the transport cost.

Channel five moves from the farmers to the processor then to the consumer. This channel was most common in Tharaka-Nithi and Embu. These are farmers who have above 20kg of soybean and know where to sell their soybean and they consider it because it is cheaper and they are sure to sell their soybean.

Channel six links the wholesalers to the processors to the consumer. The wholesalers in this channel mostly source the soybean from out of the three counties (from Busia, soybean from Uganda and also DR Congo) then sell to the processors who processes and sell to the consumers. These wholesalers buy at least 90kg of soybean from those areas.

Channel seven moves from the farmer to the wholesaler to retailer then consumer. These also are larger scale farmers who produce at least 45kg of soybean. These farmers prefer the wholesalers because they do not have to bear the transport cost to sell and also, they can negotiate the prices at which to sell. This channel was not common in the three counties however used mostly by farmers who do not belong to any soybean farmer group.

Channel eight moves from farmer to retailer then consumer. The farmers in this category also have very little quantities. This channel was not very common in the three counties however used mostly by farmers who know a retailer.

3.2 Market Concentration for Retailers, Wholesalers, and Processors

The majority of retailers traded between 16 and 360 Kg of soybean with an average of 47Kg of soybean per year. This results goes in line with that of (Nzima & Dzanja, 2015) who also found out that the average quantity of soybean handled by traders was less than 450kg. The HHI for retailers was 0.1701 and lies within the range 0.100 and 0.1800. According to (Diallo*., et al* 2015, Acosta *et al.,* 2019) this value implies that, retailers are moderately concentrated in the market, hence no single retailer or a group of

retailers can influence the market price of soybean.

Table 2: Average amount of soybean traded by traders

Traders	Minimum	Average	Maximum	HHI
Assemblers	540	793	1080	0.359
Wholesalers	135	333.3	630	0.0997
Retailers	16	47	360	0.1701
Processors	13	696	4500	0.2955

Source:*Field Survey 2018*

The average quantity of soybean traded per wholesaler was 333.3kg per person in the year 2016 and also the wholesalers sell between 135kg and 630kg per year (Table 2). The HHI index for wholesalers was 0.0997 which is below 0.1 implying that the market for wholesalers was competitive. This implies that no one wholesaler can have an Influence on the price at which soybean is sold

The HHI for retailers was 0.1701 and lies within the range 0.100 and 0.1800.According to (Diallo*., et al* 2015,Chiatoh & Gyau, 2016) this value implies that, retailers are moderately concentrated in the market, hence no single retailer or a group of retailers can influence the market price of soybean hence some competition. This is because most of the retailers' trade in very little quantities and do not have enough quantities so as to influence the market price.

The HHI for processors was 0.295529 and according to Diallo *et al.,*(2015) any HHI value above 0.18 is highly concentrated. The value of CR_4 was .897 and this value implies that four processors in the three counties control almost 90 percent of what was handled by the total number of processors. Based on the result obtained from the HHI and CR_4 the market structure was an oligopolistic market structure. In addition, processors were the highest buyer of soybean in the study area with 69.4% of the soybean produced in the study area was bought by the processors.

3.3 Market Conduct

The most common pricing behavior among farmers was that of negotiation. However, there was fixed pricing behavior. Farmers had the option of either selling directly to the processors at a fixed price whereby they bare the transport cost or sell to assemblers so the assembler sells to the processor. The farmers could also sell to either the wholesalers or retailers at a negotiable price above or below Ksh60 depending on the supply of soybean during that particular season. However, because the number of wholesalers and retailers available for the farmers were few, the ready market for farmers was to sell to the processors.

Table 3: Pricing behavior between actors

	Assemblers	Wholesalers	Retailers	Processors
Farmers	Fixed	Bargaining	Bargaining	Fixed
Assemblers		Bargaining		Fixed
Wholesalers	Bargaining		Bargaining	Fixed
Retailers		Bargaining		Bargaining
Processors	Fixed	Fixed	Bargaining	

Source:*Field Survey 2018*

Based on the data collected, 80% of farmers sold their produce directly to the processors or pass through an assembler who sells to the processor and the farmer is the person who bears the transport cost. The remaining 20% sold their produce directly to wholesalers or retailers and the transport cost was being considered in the price negotiation. There was no exchange of soybean between assemblers and assemblers, assemblers and retailers, wholesalers and wholesalers, and between processors and processors.

3.4 Market performance

Table 4: Gross Marketing Margin and Marketing Efficiency Index in each Channel

	Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8
TGMM	100	20 % (15%)	62%	20 % (15%)	20 % (15%)	20 % (15%)	62%	62%
Assemblers		0.14	0.14					
Wholesalers'			0.05			0.14	0.05	
Retailers 1			0.24				0.24	.38
Processors		0.66(0.85)		.76(.83)	0.8(0.85)	0.8(0.85)		
Retailer 2				0.8(0.85)				

Gross Margin for producers		240(340)	36.56	240(340)	240(340)	240(340)	36.56	36.56
MEI	∞	.26(0.18)	1.60	.26(.19)	.25(.17)	.26(0.18)	1.61	1.54

Values for processors are for soy drink and soy flour respectively

Source:*Field Survey 2018*

In table 4 above, it shows gross marketing margin (GMM) and marketing efficiency index (MEI) for all channels. Farmers' share of the GMM was lowest for channel 2,4,5,6 (20% and 15%for soy drink and soy flour respectively) and highest for channel 1. The producer shares increased because farmers played the role done by wholesalers and retailers and took profits that could have gone to them. Channels 3, 7 and 8 recorded same producer share (62%) despite differences in the number of players in each channel because farmers sold their produce to all types of traders in their locality. The farmers' selling price was the same for all the channels but the consumer price differed. Marketing Efficiency Indices were calculated to determine level of marketing efficiency for all channels. Channel 1 showed the highest index of positive infinity. This was followed by Channels 7, 3, 8, 4, 2, 6 and 5 respectively. The results are presented in Table 4 above.

3.5 Constraints to Soybean Marketing

Farmers groups reported that what limited them most were low prices being offered. The also complained of delay in payments, inadequate means of transport, low demand in some cases, inability to meets the quality grades, delay in buying and in payment, and problem of assessing reliable market information.

Wholesalers and retailers reported the problem of inadequate supply. They also talked of irregular supply and also the period of soybean availability was very short. They reported that they were not able to get in contact with soybean farmers.

Processors and processing companies complained of in adequate supply of soybean from the country. This can be seen from the fact that most of the soybean they got was imported. They import more than half of the quantity of soybean they require from out of the country (Uganda, Malawi and DR Congo).

4.0 CONCLUSIONS AND RECOMMENDATIONS

The main objective of the study was to analyze the structure, conduct and performance of soybean marketing in Embu, TharakaNithi and Meru Counties. Eight (8) marketing channels were in operation in the study area. The Herfindanl-Hirschman index (HHI) showed that wholesalers were competitive; retailers were relatively competitive while processors indicated an oligopolistic market structure. Processors bought more than 60% of the total soybean traded in the study area. The market for processors indicated an oligopolistic structure hence it can be concluded that processors had a higher say when it come to the determination of the market price for soybean. Based on the conduct of the respondents, it can be concluded that wholesalers, retailers and assemblers did not engage in group marketing hence cannot influence the market price for soybean. On the other hand, processors indicated an oligopolistic market structure and based on their conduct, it can be concluded that they can influence the price at which they buy soybean. Based on the Marketing Efficiency Indices it can be concluded that Channel one involving direct selling from farmer to consumer was the most efficient because it had the highest index of positive infinity. The major constraints faced by farmer groups in marketing are low prices being offered and delay in payments. The major constraint faced by wholesalers, retailers, and processors in getting soybean was mainly inadequate supply due to the very small quantities supplied by farmers thus increasing the marketing cost. Based on the results, the study recommends more processors to enter the soybean market and also farmers be involved in value addition so as to increase their returns.

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