

Market Chain Analysis of Cassava in Wolaita Zone, Snnpr, Ethiopia.

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Abstract

This study aimed at identifying cassava Market actors and their functions, analyzing distribution of margins along cassava market actors. A survey was carried out on six randomly selected kebele administrations in Gassuba and Kindo Koysha Woreda of wolaita zone. Both primary and secondary sources of data were used to conduct this study. Primary data for this study were collected from 122 farmers, 48 traders and 23 consumers through application of appropriate sampling procedures and secondary data were obtained from written documents. Data were collected by using both close ended and open ended questionnaire through personal interview, group discussion, and key informant interview. Both descriptive and inferential statistics were used to analyze the data. The market chain and margin analysis indicated that the marketing and consumption, the major actors in the market chain are cassava producers, collectors, wholesalers, retailers, processors and consumers and about 89.43% of gross marketing margin in cassava market chain goes to cassava traders and producers earn about 10.57% of gross marketing margin. Therefore, policy initiatives aiming at increasing training on post harvest loss, improving marketing information system and extension service provisions are recommended to intervene on the development of cassava value chain in the study area.

Keywords: Market channel, market chain, market margin and market actors

INTRODUCTION

Cassava (*Manihot esculenta* Crantz) is a tropical woody shrub. It is a dicotyledonous plant belonging to the botanical family Euphorbiaceae (Onwueme and Charles, 1994). It is the fourth most important crop for farmers in tropics after rice, wheat and sugar, consumed by up to a billion people globally (FAOSTAT, 2010). It originated from North East Brazil with an additional centre of origin in Central America (Elias et al., 2001; Nassar and Ortiz, 2008).

Though the domestication of cassava started from these areas, it is cultivated in tropical and subtropical areas of the world (Elias et al., 2001). Of all the tropical root crops, cassava is the most widely distributed and cultivated root crop in different parts of Africa. It is being cultivated as the main source of energy and as the most important staple food crop for over 900 millions of people in the world (Key, 1987; Onwueme and Sinha, 1991).

In sub-Saharan Africa (SSA) cassava is mainly a subsistence crop grown for food by small-scale farmers who sell the surplus. It grows well in poor soils with limited labor requirements. It provides food security during conflicts when the invader cannot easily destroy or remove the crop, since it conveniently grows underground. Cassava is usually intercropped with cassavas, plantation crops (such as coconut, oil palm, and coffee), yam, sweet potato, melon, maize, rice, groundnut, or other legumes. The application of fertilizer remains limited among small-scale farmers due to the high cost and lack of availability. Roots can be harvested between 6 months and 3 years after planting. Apart from food, cassava is very versatile and its derivatives and starch are applicable in many types of products such as foods, confectionery, sweeteners, glues, plywood, textiles, paper, biodegradable products, monosodium glutamate, and drugs. Cassava chips and pellets are used in animal feed and alcohol production (IITA, 2009).

In Central Africa alone, cassava is estimated to provide over 1000 kcal per day to 30 million the leaves, which contain appreciable amounts of vitamins, minerals and proteins, are consumed as a preferred green cassava in many parts of Africa, providing protein, minerals and vitamins (Hahn et al., 1989). It is particularly important in those areas where food supply is constantly threatened by environmental constraints such as drought and pest outbreaks, because of its ability to grow under conditions considered as suboptimal for the majority of food crops. It can be harvested any time from 6 to 24 months after planting and can be left in the ground as a food reserve for household food security in times of famine, drought and war (FAO, 2000).

Production of cassava by smallholder farmers of the Wolaita zone is mainly for market and consumption. The production is mainly subsistence and there are years surplus is produced and also drought years. Cassava production in wolaita zone is mainly constrained by seasonality where surplus at harvest is the main characteristics of the product. The nature of the product on one hand and lack of organized marketing system on the other often resulted in low producers' price. Moreover there is a need to employ a market chain approach to fully understand and resolve the problem of cassava production at all levels.

This study is designed to address the prevailing information gap on the subject and contribute to proper understanding of the challenges and assist in developing improved market development strategies to benefit of smallholder farmers, traders, and other market participants.

Material and Method

Description of the Study Area

Wolaita zone is located 390km southwest of Addis Ababa following the tarmac road that passes through *Shashamane* to *Arbaminch*. Alternatively, it is located 330km southwest of Addis Ababa following the tarmac road that passes through *Hosanna* to *Arbaminch*. *Wolaita Sodo* is the town of the zone. It has a total area of 4,541km² and is composed of 12 *woredas* and 3 registered towns. It is approximately 2000 meters above sea level and its altitude ranges from 700-2900 meters. The population of *Wolaita* zone is about 1,527,908 million of which 49.3% are male and 51.7% are female (WZFED, 2013). Out of these, 11.7% live in towns and the rest 88.3% live in rural areas.

Sampling Techniques

Two Potentially cassava producing *woredas* was purposively selected out of the total 12 *woredas* in *wolaita* zone based mainly on their maximum area of land allocated for cassava. Similarly *kebeles* was selected from respective *woredas*. Then, producers from a complete and separate list of cassava producers in each *kebeles* was prepared. Finally, based on proportional probability sampling the total number of respondents was determined by using the formula, as indicated in (Hillocks et.al. , 2002).

The following formula was used to calculate sample size:

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

Where; n: designates the sample size the researcher uses;

N: designates total number of households in six *Kebeles* =9286

e: designates maximum variability or margin of error =0.09

l: designates the probability of the event occurring

Data Gathering Tools

To gather data for the research, semi-structured and structured questionnaire, interview, group discussion and reviewing documents (for secondary data) was used.

Data Gathering Procedure

A pre-tested and semi-structured schedule or questionnaire were designed to collect data on marketing channels, costs, price of cassava, and constraints or problems of cassava value chain. Enumerators with education level of diploma and degree were recruited and trained mainly concerning technique of interviewing. Key informants survey was made to identify the prospects and constraints on cassava production, the effectiveness of production, marketing constraints, credit facilities, availability of extension services, access to and availability of market information and marketing cost. Moreover, secondary data related to market fees, facilities and services were collected from the *Woredas'* and *Wolaita Zone Office of Agriculture* and other relevant sources.

Method of Data Analysis

The structure - conduct and performance approach was used to analyze the data.

Analysis of market structure: The Structure of market refers to the characteristics of the organization of the markets that have significant influence on the nature of competition and pricing within the market. There are two strategic features. The first is the number and relative size of the firms involved. Do one or two large firms dominate the others? The second deals with business relationship between them, are they interdependent or interlinked in ownership and management? Does a formal contract or informal understanding connect them? How easy is it for new firms to come into the system? (Abbot, 1981). Therefore such questions will be prepared to understand the structure of cassava market in the areas.

Concentration Ratio (C)

Market concentration is defined as the number and size distribution of sellers and buyers in the market. It plays a large part in the determination of market behavior with in an industry because it affects the interdependence of action among firms. The greater the degree of the concentration is the greater the possibility of non-competitive behavior, such as collusion would be in the market Abbot, 1981).

$$C = \sum_{i=1}^r S_i \quad i=1, 2, 3 \dots r$$

Where C - Concentration ratio,

S_i - Percentage share of the i^{th} firm (based on the amount of cassava bought and sold),

r - Number of largest firms for which the ratio is going to be calculated

$$S_i = \frac{V_i}{\sum V_i}$$

Where S_i – market share of buyer i

V_i – amount of product handled by buyer i

$\sum V_i$ - total amount of product handled

As a rule of thumb, concentration ratios of 50 % or more is indicative of strongly oligopolistic industry, of 33-50% a weak oligopoly, and less than that, an un-concentrated industry. This is the number and size distribution of sellers and buyers in the market (Kohls and Uhl, 1985).

Analysis of market conduct: Market conduct refers to firm behavior like pricing and selling policies and tactics, overt and tacit inter-firm cooperation, or rivalry and research and development activities (Scarborough and Kydd, 1992). It is the pattern of behavior of enterprises in determining prices, sales promotion, and coordination policies and the extent of predatory or exclusionary tactics directed against established rivals or potential entrants (Kohls and Uhl, 1985).

Analysis of Market Performance: Marketing efficiency is essentially the degree of market performance.

These are the most important because satisfaction of the consumer at lowest possible cost must go hand in hand with maintenance of high volume of farm output (Ranakumar, 2001). The two approaches to measure marketing performance are: marketing margin and the analysis of market channel efficiency.

Marketing margin is most commonly used to refer the difference between producer and consumer prices of an equivalent quantity and quality of commodity. However, it may also describe price differences between other points the marketing chain, for example between producer and wholesale, wholesale and retail, prices (Scarborough and Kydd, 1992).

When there are several participants in the marketing chain, the margin is calculated by finding the price variations at different segments and then comparing them with the final price to the consumer. Consumer price is the base or common denominator for all marketing margins (Mendoza, 1995). The relative sizes of various market participants' gross margins can indicate where in the marketing chain value is added and / or profits are made.

The total gross margins is given by the following formula

$$TGM = \frac{\text{End buyers p} - 1^{\text{st}} \text{ sellers p}}{\text{End buyers p}} \times 100$$

Where, TGM=Total Gross Marketing Margin, p= price

It is useful to introduce the idea of 'producer's participation', 'farmer's portion', or 'producer's gross margin'(GMMP) which is the portion of the price paid by the consumer that goes to the producer .The producer's margin is calculated as a difference:

$$GMMP = \frac{\text{End buyers price} - \text{Marketing gross margin}}{\text{End buyers price}} \times 100$$

Where, GMMP= Producer's share in consumer price

And,

$$P_s = \frac{P_x}{P_r} = 1 - \frac{MM}{P_r}$$

Where

P_s = Producer's share

P_x = producer's price

P_r = retail price, and

MM = Marketing margin

In marketing chain with only one trader between producer and consumer, the net marketing margin (NMM) is the percentage over the final price earned by the intermediaries as his/her net income once his marketing costs are deducted.

$$NMM = \frac{\text{Gross margin} - \text{Marketing cost}}{\text{Price paid by the consumer}} \times 100$$

Marketing channels-The analysis of marketing channels is intended to provide a systematic knowledge of the flow of the goods and services from their origin(producer) to their final destinations(consumers) (Mendoza, 1995). This is acquired through studying the participants, with the first step to determine what and which final

markets are. While the source and destinations are clearly identified the study of participants within the channels, the activities they perform and the overall actions can easily be investigated.

RESULTS AND DISCUSSION

This section presents the results of the analysis. The descriptive analysis describes the general characteristics of the sampled farm households and cassava traders, structure, conduct and performance of cassava market in the study area.

Market participants, their roles and linkages in cassava market

In this study, different cassava market chainactors were identified in the exchange functions between farmer and final consumer. The main actors involved in cassava market chainin the study area include producers, wholesalers, retailers, rural assemblers, processors (*enjera and bread beakers*) and consumers. Even though, each participant was involved in different activities, based on major activities undertaken, the sample market participants were categorized into the following different categories.

Producers: Producers are the first link in the value chain. Majority of farmer produced cassava and sold in local market like (Gassuba, and Bale-hamuso) market. Out of 121 respondent 39.4% and 60.6 % of the sample households answered that they sold to, Bale-Hamuso, and Gassuba markets, respectively. They transport cassava to the nearest markets using trucks, using Pack animals and head/backload. The study shows that 80% of the sample household used head/backload until the main road and then trucks for the rest distance and the rest 20% uses truck only (Table 1).

Wholesalers: Wholesalers are market participants who buy large quantities of cassava and resell to other traders. They purchase cassava in Kindo koyosha, and Gassuba market from rural assemblers in a larger volume than any other marketing actor does. They relatively spend their full time in wholesale buying throughout the year in and out of the districts. Each wholesaler used Isuzu trucks as a transportation vehicle from gassuba and Bale - Hamuso to Hawassa.

Retailers: This was one of the final links in the chain that delivers cassava to consumers. They were numerous (19) as compared to rural assembler (6) and their function was selling cassava to consumers in small volumes after receiving large volumes from rural assembler and producers.

Table 1. Market participants and their roles

Market participant	Market activities	Markets and number of marketing agents (%)					Transportation		
		Gassuba	Bale-hamuso	Sodo	Hawassa	Addis Ababa	Head/back	Pack animals	Truck
producers	Sale	68(56.2)	53(43.8)				28(23.1)	58(47.9)	35(28.9)
Rural assembler	Purchase	4(57.1)	3(42.9)					5(71.4)	2(28.6)
Wholesaler	Sale	3(42.9)	2(28.6)	2(28.6)					
	Purchase	2	2						4(100)
Retailer	Sale				2	2(100)			
	Purchase	8(15.8)	5(42.1)	2(42.1)				7	8
	Sale	7(21)	4(21)	4(15.8)					
Processor	Purchase	5(11.8)	3(35.3)	5(52.9)				10	3
	Sale	4(11.8)	3(11.8)	2	2(64.7)	1			

Note that the figures in the parentheses are the percentage of respondents replied to the questions on market activities.

Source: survey result (2016).

Rural assemblers: They were farmers or part time traders who collect cassava from farmers in Gassuba (33.3%), and Bale Hamuso (33.3%) markets as well as from their houses for the purpose of reselling it to wholesalers, retailers and processors in Gasuba (33.3%), kindo koyisha and (16.7%) and Markato market (33.3%). They plaid important role and they do know areas of surplus well.

Processors: These are retailers in urban areas who supply cassava to consumers. They buy cassava from rural assembler, retailers and producers and sell in the form of injera and Bread to the consumer.

Consumers: From the consumer point of view, the shorter the market chain, the more likely is the retail price going to be low and affordable. They are individual households; they buy the commodity for their own consumption only. Consumers' consumption patterns/demand structure, purchasing power and traditions/norms were assumed to largely affect the potential market for agricultural commodities.

Cassava Market Channel

The analysis of marketing channels was intended to know the alternative routes that the product follows from the point of origin to final destination. Six main alternative channels were identified for cassava marketing. The main marketing channels identified from the point of production until the product reaches to the final consumer through different intermediaries were.

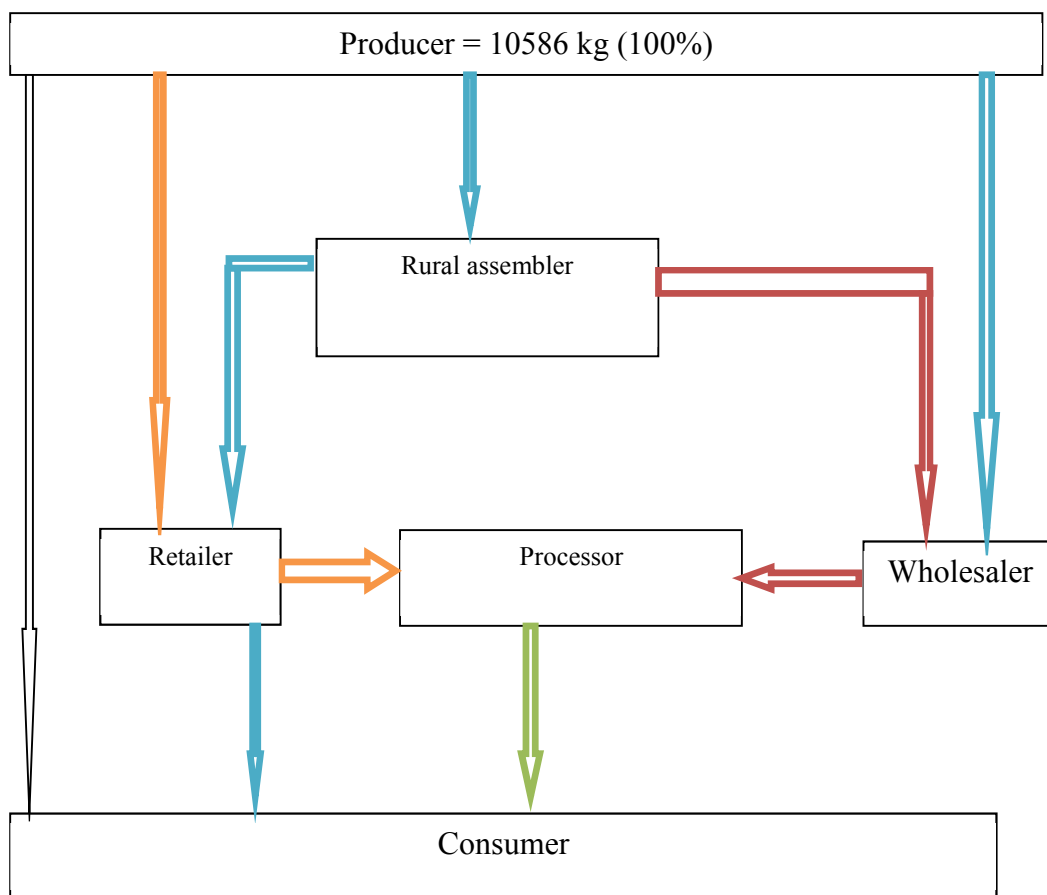
- channel I: producer → consumers = 467
- Channel II: Producer → retailer → consumer = 2384
- Channel III: Producer → retailer → processor → consumer = 1076
- Channel IV: Producer → rural assembler → retailer → processor → consumer = 1403
- Channel V: Producer → wholesaler → processor → consumer = 2219
- Channel VI: Producer → rural assembler → wholesaler → processor → consumer = 3416
- Channel VII: Producer → rural assembler → retailer → consumer = 860





The channel comparison was made based on volume that passed through each channel. Accordingly, market channel VI carried the largest volume i.e. 3416qt of cassava in a year, which was 30.7 percent of the total volume followed by market channel IV that carried about 28 percent of the total marketed (Figure 3).

Cassava Market Structure

The structure of a marketing system should be evaluated in terms of the degree of market concentration, barrier to entry (licensing procedure, lack of capital, risk and experience), and the degree of transparency (Pender *et al.*, 2004). Similarly, in the study area structure of cassava market was described using market concentration, the degree of transparency (market information) and entry conditions (licensing procedure, access to credit, risk and experience).

Figure 1: Cassava market channel for different market participant



Where:  Channel III  Channel I
 Channel II  Channel IV
 Source: survey result (2015).

Degree of market concentration

Even though different types of cassava traders were available in the study sites, due to their limited number in their respective locality, district level market concentration ratio has been calculated to analyze the type of markets prevailed. In addition, the computation was performed by taking the annual or total volume of cassava purchased in 2015 by sample traders at area level. As indicate in table 12, cassava market at Wolaita zone district

was strong oligopoly. The CR4 measures of market concentration ratio showed that the top four or 36.4% of the traders were controlled 49.05 % of the cassava market in 2015 (Table 12).

Table 2: The concentration ratio of sample markets

Channel	Number traders	Cumulative of traders	% of cumulative of traders	zone total		
				Quantity purchased	% share of purchase	% of cumulative purchase
VI	3	3	23.1	3416	28.89	28.89
II	1	4	30.8	2384	20.16	49.05
V	2	6	46.2	2219	18.77	67.82
III	2	8	72.7	1076	9.20	77.02
IV	3	11	84.6	1403	11.86	88.88
VII	2	13	100	860	7.27	96.05
VI	0	13	100	467	3.95	100.00
Total				11825		

Source: survey result (2013).

Degree of Market Transparency

There is system of dissemination of market information. However it is not transparent among cassava traders in sample markets and farmers. About 74 % of the traders stated willingness to pay for information cost, if there were well organized and transparent information center. However, in the sample markets, all traders had information through different sources. Cassava traders rely on contact to other traders to obtain market information regarding price in hawasa and shashemane. Moreover, information on price in the nearby market is unevenly distributed among all sample traders indicating that they have access to their information.

Survey result indicated that 38% of the sample traders got price information through the combination of telephone, personal observation and other traders and brokers. About 28% and 17 % of the traders knew price by personal observation and from other traders, respectively. The rest of traders had information through telephone only and through apparent acts of traders interested to buy large quantity of cassava at higher price. In these cases price information was the main problem in cassava market.

Barrier to Entry

Licensing Procedure: Based on the informal survey results, there were about 200 different unlicensed traders in each market. In Kindo Koyisha district, there were only two traders (wholesalers) registered with the initial capital of 40000 Birr each. According to this study there are no restrictions to enter in the cassava markets in respect to license in Kindo Koyisha markets.

In Gassuba district most of wholesalers had trade license. There were 23 traders registered according to their capital who reside in Gassuba town. There are two types of registration; those who have an initial capital of 40,000 Birr are considered as wholesalers. They purchase cassava in local markets and transported to terminal markets (hawasa and shashemane). Those who are registered with initial capital of 1000 birr are considered as retailer/urban assemblers and can purchase and sell in regional markets only.

But from the sampled traders 33% of them have cassava-trade license and 67% of the sample traders had no cassava-trade license. According to the survey result more than 50 percent of the traders responded that it is easy to get cassava trade license if they fulfill the initial capital requirement. In practice, however, this is not the case, as most of the traders operating in the study areas had no cassava-trade license; therefore it seems that, there was no restriction to enter in the cassava markets with relation to cassava trading license.

Capital: Traders were constrained from receiving credit from micro finance for lack of guarantor and complicated process to get credit. In the survey about 87% of the sample traders respond that major problem to run their business was lack of capital. In interviews, they stated that their greatest constraint is access to finance, which they view as a constraining factor in expanding their scale of operations, achieving greater efficiency, and engaging in the long-term storage needed. In these cases, capital requirement discourage entry into cassava trading.

Lack of experience: From survey result more than 50% had been in cassava trading business for more than 5 years. Survey result reveals that, 43%, 35%, 13% and 9% of traders had 1-5, 6-10, and 11-15 and 16-20 years of experience, respectively (Table 3).

The majority of traders found in over all markets that had 1-5 and 6-10 years of experience. There appears relatively high variation within a sample that it is from 2 to 20 years of experience. This may explain that there is no barrier to entry in cassava trade with respect to years of experience.

Table 3. Experience in cassava trading

Years range	N=48	
	Total	%
1-5	21	43.75
6-10	17	34.4
11-16	6	12.5
16-20	4	8.33

Source: survey result, 2006

Cassava market conduct

Producers market characteristics

Based on the result of this survey, of the total sampled cassava producers only 5.8 % of all their harvested cassava used for their own consumption. The remaining huge amount; about 94.5 of the total cassava harvested by sample producer were sold to traders and consumers.

Traders purchasing and selling strategies

The major factors that affect the price of cassava in the study area includes; peak harvesting season, proximity to urban consumers, amount of cassava supplied to market and quality of the cassava. Relating to the purchasing price formation of the traders, about 72% of the sampled traders set purchase price by themselves. While 42% of the sampled traders price formation was done through negotiation with producers and wholesalers or *processors* in hawasa and shashemane market respectively.

Marketing Costs and Margins

Marketing cost

Table 4 indicates different types of marketing cost related to the transaction of cassava by assemblers, wholesalers (urban and regional), farmer traders, retailers, and commission agents. The structure of marketing cost reveals that storage loss is the highest cost for each marketing agents. This is due to the loss of moisture content of cassava. Thus, the storage loss is the amount highest followed by transport even for traders in terminal markets. Among cassava traders, commission agents has lowest marketing cost because they buy cassava at market place and regional wholesalers receive all the cassava at market place and cover other related cost. Farmer traders relatively incur highest cost of all other traders because they incur additional cost (head load cost) since they transport cassava from farmer to the market.

Table 4. Marketing cost for different marketing agents (Birr/qt)

Agent	Regional Wholesaler	Retailer	Assembler	Commission agent	Processors
Sack	5.70	3	8	3	5
Fill & stitch	2.50	1	2	3	2
Load	3.00	5	1.82		2
Unload	3.50				
Vehicle	50.00		1		1
Cart			2.50		
Head load		6	6.50		
Sorting		3	2		2
Storage	3.71	1.67	2		2
Storage loss	16.00	10	8		8
Telephone	1.23	1	0.90		0.90
Guard	1.08		2		2
Information	1.33	1	2.20	35	2.20
Personal expense	5.15		9.17	2	9.17
Weighing		2.50			8
Sieving					20
Milling					35
Total Marketing cost	93.20	34.17	48.09	43	98.46

Source: own computation, 2016

Marketing Margin

Table 5 gives an overview of the marketing margin among different actors in different channels. The total gross marketing margin (TGMM) is highest in Channel V and followed by channel VI which accounts for 72.36 and 56.05% of the consumer's price, respectively.

Table 1. Marketing margins for cassava traders in different marketing channels

Marketing Margins	I	II	III	IV	V	VI	VII
TGMM	95%	75%	42.9%	57.8%	46.25%	32.5%	65%
Producers price	400	300	300	260	370	260	260
Purchase price					370	400	
Selling price					600	600	
GMM _{ws}					230	200	
Marketing cost					93.20	93.20	
NMM _{ws}					136.80	106.80	
Purchase price				260		260	260
Selling price				370		400	370
GMM _{ra}				110		160	110
Marketing cost				84.17		84.17	84.17
NMM _{ra}				25.83		75.83	25.83
Purchase price		300	300	370			370
Selling price		400	400	450			400
GMM _{rt}		100	100	80			30
Marketing cost		48.09	48.09	48.09			10
NMM _{rt}		51.91	51.91	31.91			20
Purchase price			400	450	600	600	
Selling price			700	700	800	800	
GMM _p			300	300	200	200	
Marketing cost			98.46	98.46		128.46	
NMM _p			201.54	201.54		71.54	

Source: own computation, 2016

TGMM is lowest which accounts 32.5% of the consumer's price in channel VI and producer's share (GMM_p) is highest (95%) in consumers' price in Channel I. In general producer's share in consumer price is less than 50% in all channels except channels VI and VII.

Among different traders and processors, 'processors obtain relatively highest NMM of consumer's price, followed by Wholesalers. NMM are somewhat high in channel IV, V, VI and VII which accounts, 201.54, 201.54, 136.8 and 106.8% of consumer price, respectively.

The study has duly focused on the structure and conduct, market participants of cassava markets. The data were generated by individual interview and group discussion using pre tested semi structured questionnaires and checklist. This was supplemented by secondary data collected. The main findings of this research were summarized as follows.

Quantity of cassava passed through different marketing agents from farmers to consumers. However, 3416 quintals and 2384 quintals of farmers production were passed through channel VI and channel II', respectively in 2016.

Structure of cassava market indicates that four-firm Concentration Ratio (CR₄), that is, the share of the largest four traders in the total volume of cassava purchased. Hawassa and Gassuba, in particular, is characterized by a large number of participants and a high level of market concentration.

However, the four largest traders handled 49.05% of the total volume of purchased cassava. Regarding the conduct of cassava market, pricing strategy of the traders indicated that 72% of traders set their purchase price.

Based on the findings of this study, the following policy measures could be recommended, because there is a need for the promotion of increasing cassava production and market supply.

The enhancement of cassava producers' bargaining power through cooperatives is the best measure that should target at reducing the oligopolistic market structure in the regional markets. Such measure also facilitates the regular supply of cassava at reasonable price to consumers.

There is an urgent need for government intervention with regard to cassava market price setting strategy in Wolaita zone. It is different from other markets and usually price setting is by traders. This needs measures from the relevant government organs.

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