

# Market Structure and Chain Analysis of Haricot Bean (*Phaseolus Vulgaris L.*)

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## Abstract

Haricot bean is now becoming one of the most reputable crops for its role for human consumption. A research was undertaken in Enebse Sar Midir district, northern Ethiopia, with the objectives of identifying the different marketing channels, evaluating the marketing margins and examining the market structure. Data were gathered using formal and informal methods of data collection and processed using SPSS-20. The result revealed that a total of 15,200 tons of haricot bean was produced in the district in and of this; 13,468 tons was found to pass through the marketing channels during 2011/2012. Following the marketing chains, 7 marketing channels were identified. Market concentration measures indicated that markets were found to be strongly oligopolistic and inefficient in structure (with wide final consumers' price spread). Gross marketing margin was maximum for city wholesalers (38.60%) and minimum for farmer traders (13.22%) of the consumers' price). Net marketing margin was maximum (11.52%) for processors and minimum (7.36) for rural assemblers. In order to empower producers, marketing actors and intensify the existing business, the structure and efficiency of haricot bean markets have to be improved. Empowering producers with financially (facilitating credit) and training can improve the market structure and performance.

**Keywords:** Ethiopia, Marketing actors, Market concentration, Market efficiency, Oligopoly.

## 1. INTRODUCTION

Haricot bean (*Phaseolus vulgaris L.*) belongs to the order Rosales and family *Leguminosae* (CIAT, 1989). It is well adapted to areas that receive an annual average rainfall ranging from 500–1500 mm with optimum temperature range of 16°C–24 °C, and a frost free period of 105 to 120 days (Wortman and Eledu, 1997).

In Ethiopia, diverse cultivars of haricot beans (mottled, red kidney, white and gray) are produced by smallholder growers for commercial export to the European Union. Despite increases in the export of haricot beans over the last few years, improvements in quality and yield were limited by the availability of quality seed. Small holder farmers still utilize uncertified seeds that produce low yields and were not resistant to disease. In addition, poor agronomic practices also contributed to low smallholder yields (USAID, 2011)

Haricot beans are used as source of foreign currency, food crop, means of employment, source of cash, and plays great role in the farming system (CSA, 2010).

Haricot beans may be consumed in various forms, dry seeds, green pods and green-shelled seed (Key, 1979; Singn, 1997). According to Bennink (2005), there is an increasing demand for common bean in the world because of its significance for human nutrition as a source of proteins, complex carbohydrates, vitamins, and minerals.

Haricot bean is becoming one of the dominant export cash crops of Ethiopia. However, the share of pulses in general in the export market has been limited by external demand for quality (Gezahegn and Dawit, 2006).

Haricot bean is produced in many parts of Ethiopia including East Gojjam (Enebse Sar Midir District), Wollo, Rift valley areas and in many areas in the southern Ethiopia (EIAR, 2014). Despite the nutritional and economic importance of haricot bean, various factors contribute for the existence of inefficient markets. Poor marketing practices, price instabilities and poor handling practices are prevailing that discourage producers. The problems in turn resulted in supply shortage in the area (BoARD, 2011) Hence, improving the market structure and efficiency should be a priority for improving the supply and help the producers to be beneficiaries of the commodity. In order to achieve this, nature of the marketing channels, activities of the marketing actors and existing constraints and opportunities need to be analyzed. Thus, this study was initiated to investigate the different marketing channels and analyze the marketing margins along the market chains linking the market in the study area to the foreign, national and regional haricot bean markets.

## Objectives of the Study

The research was undertaken to achieve the following specific objectives:

- 1) Identifying the various market chains and channels
- 2) Evaluating the marketing margins and examining the market structure
- 3) Studying the functions of various marketing actors along the chain

## 2. MATERIALS AND METHODS

### 2.1 Description of the Study Area

Enbise Sar Midir District is located in northwestern Ethiopia bordered by the Blue Nile River to the East. The district is endowed with varying agro-ecologies suitable for the production of haricot bean. The altitude ranges from 700-3,664 meters above sea level. The area receives annual rainfall of 900-1200mm with annual temperature range from 10.5 to 26°C. These suitable agro-ecological requirements made the area to be one of the major producers and supply sources of haricot bean.

The altitude and rainfall ranges for the growth of haricot bean are 600-2,200m and 450-700mm per annum respectively. Haricot bean is one of the major pulse crops produced for consumption, local markets and export. The crop produced in the district takes the major share of domestic transaction of the commodity.

### 2.2 Secondary Data Collection

Total output, number of haricot bean traders and price of haricot bean were taken from secondary sources. Secondary data sources included the Bureau of Agriculture and Rural Development (BoARD) and Central Statistical Authority (CSA) of Ethiopia.

### 2.3 Primary Data Collection

Primary data were collected from individual households and concerned organizations with an interview schedule. The data were collected from individual interviews. Primary data were gathered from haricot bean traders, intermediaries of the market chain, concerned government officials and non-government bodies. Informal methods of data gathering (group discussion with key informants and Rapid Market Appraisal) were also employed.

In order to generate primary data, a total of 110 haricot bean traders were selected using a two stages random sampling method (Mendoza and Rosegrant, 1995).

In the first stage, market centers were selected purposively based on their haricot bean production potentials. In the second stage, based on proportion of traders in each market center, the total sample size (110) was proportionately shared among these market centers and respondents were selected at random. Respondents taken from each marketing actors (farmer traders, wholesalers, assemblers, retailers and other marketing actors) is as shown in Table 1.

Table 1. Sample size of traders

Kebele/Town	Farmer Traders	Rural Assemblers	Town Assemblers	City Wholesalers	Processors	Exporters	Total
Mertulemaiam			18 (18)				18
Anisa	12 (14)	25 (26)					37
Geses	7 (8)	13 (15)					20
Addis Ababa				17 (17)	10 (11)	8 (8)	35
<b>Total</b>	<b>19 (22)</b>	<b>38 (41)</b>	<b>18 (18)</b>	<b>17 (17)</b>	<b>10 (11)</b>	<b>8 (8)</b>	<b>110</b>

Note: Numbers in the parenthesis represent number of traders actually present in each category

Source: Own survey, 2012

### 2.4 Methods of Data Collection

Prior to the actual data gathering, five-day training was given to 6 enumerators. These enumerators were frequently supervised and the required data from the producers were gathered using a pre-tested interview schedule. For the traders, rapid market appraisal (RMA) with group discussion, key informant discussions and also direct observation were undertaken in triangulation along the market chain in order to acquire different ideas and diverse view points of traders from different corners.

### 2.5 Methods of Data Analysis

Means, percentages, variances, standard deviations and ratios were used to examine the relevant variables. The specific indicators quantified were:

#### 2.5.1 Structure conduct performance (S-C-P) model

This model investigates the relationship between market structure, conduct and performance. This model has been used by different market researchers to address their objectives (). As indicators of the market performance, market concentration ratio and marketing margin analysis have been used along with the description of the conduct of the red haricot bean market.

#### 2.5.2 Market concentration measure

According to Tomek and Robinson (1990), concentration ratio refers to the number, and relative size of buyers in the market. The concentration of firms in the market is estimated using the common measure of market

concentration ratio. Concentration ratio is one of the commonly used methods to measure of market structure. It is given as:

$$C = \sum_{i=1}^r S_i \quad i=1,2,3,4. \quad (1)$$

Where

$S_i$  = the percentage market share of the  $i^{\text{th}}$  firm and

$r$  = the number of relatively larger firms for which the ratio is going to be calculated.

As noted by Kohl and Uhl (1995), concentration ratio of 50% or more is an indication of a strongly oligopolistic industry, 33-50 % a weak oligopoly and less than that a competitive industry. The problem associated with this index is the arbitrary selection of  $r$ , *i.e.* the number of firms that are taken to compare the ratio.

### 2.5.3 Marketing margin

Marketing margin is the difference between the price received by producers and the price paid by consumers Tomek and Robinson (1990). According to Cramer and Jensen (1982), marketing margin is the percentage of the final weighted averages selling price taken by each stage of the marketing chain. The total marketing margin is the difference between what the consumer pays and what the producer/farmer receives for his product. In other words it is the difference between retail price and farm price (Mendez and Rosegrant, 1995).

Computing the total gross marketing margin (TGMM) is always related to the final price paid by the end buyer and is expressed as percentage.

$$TGMM = \left[ \frac{\text{Consumer Price} - \text{Producer Price}}{\text{Consumer Price}} \right] \times 100 \quad (2)$$

Where,

TGMM = Total gross marketing margin

It is useful to introduce the idea of 'farmer's portion', or 'producer's gross margin' (GMM<sub>p</sub>) which is the portion of the price paid by the consumer that goes to the producer. The producer's margin is calculated as:

$$GMM_p = \left[ \frac{\text{Consumer Price} - \text{Marketing Gross Margin}}{\text{Consumer Price}} \right] \times 100 \quad (3)$$

Where,

GMM<sub>p</sub> = the producer's share in consumer price

The net marketing margin (NMM) is the percentage of the final price earned by the intermediaries as their net income after their marketing costs are deducted. Thus the net marketing margin is calculated as:

$$NMM = \left[ \frac{\text{Gross Margin} - \text{Marketing Costs}}{\text{Consumer Price}} \right] \times 100 \quad (4)$$

Where,

NMM is the net marketing margin.

### 2.5.4 Amount of haricot bean supplied to the market

The production data used for this research was haricot bean produced in Enebse Sar Midir district in 2011 production season.

## 3. RESULTS AND DISCUSSION

### 3.1 Characteristics of Haricot bean Traders and Channel Analysis

#### 3.1.1 Type and description of haricot bean traders

Down the marketing channel, there are a number of marketing actors who handle the commodity at different stages in the process of transaction. They together form the link and create the channel beginning from producers until the commodity reaches to the ultimate consumers. These different groups of haricot bean traders include farmer traders, rural assemblers, town assemblers, city wholesalers, processors and exporters.

##### 3.1.1.1 Farmer traders

These are generally seasonal traders who actively participate in times of high supply and shift to other farming businesses when market supply of haricot bean vanishes. The informal survey result revealed that on average, farmer traders had about 3 years of experience in haricot bean trading. From the total of farmer traders with whom group discussion was made, 54% of them did not have trade license.

##### 3.1.1.2 Assemblers

Two types of haricot bean assemblers are known. These are rural and urban assemblers. Assemblers collect large quantities of haricot bean from area of surplus for selling when price increases. Urban assemblers were found to

be more experienced and known for their potentials of buying big quantities as compared with the rural assemblers. This is because larger (about 56%) of them are literate and have better access to market information.

### 3.1.1.3 City wholesalers

These groups of marketing actors reside in the capital city (Addis Ababa) and collect large volume of the product purchasing from assemblers (from the rural markets or towns or city). They compete for handling big volume of haricot bean through commission agents. The commission agents designated at different market centres purchase the product with the agreement that they will sell the amount they collect a 0.25 cents per kilogram price increment. Wholesalers ultimately sell the amount they collected mainly to exporters and rarely to processors.

### 3.1.1.4 Processors

Processors purchase haricot bean with the objective of making big profit through adding value to the product. They process haricot bean and seal the food product in a container of volume about 250ml. This processed delicious product (locally called “*Wot*”) is consumed with bread, “*Injera*” or without any complementary ingredient with longer shelf life.

The result showed that of all the marketing actors, processors took the highest marketing profit (1.65Birr/Kg) next to exporters. The reason mainly attributed to value addition to the commodity.

### 3.1.1.5 Exporters

These marketing actors purchase haricot bean from different haricot bean traders within the country and supply the product to foreign countries looking for better market destinations. The survey result showed that highest marketing profit (3.90 Birr/Kg) was taken by exporters. This is due to the relative big difference between purchase price (inland) and selling (*fob, i.e., free on board*) price.

The informal discussion with these marketing actors indicated that the absence of competition (existence of only few exporters) helped them easily negotiate among themselves and reach in agreement of price determination. This enabled them make high profit as compared with other marketing actors.

Statistically significant differences were observed in demographic characteristics of marketing actors. Sex of traders was significant at 10% probability level signifying that males dominantly involved in haricot bean trading than females. Similarly, significance differences ( $P < 1\%$ ) were observed in the age of traders (Table 2). This shows that people involve in haricot bean trading irrespective of age variations.

Marketing actors with longer periods of haricot bean trading experience are supposed to have better performances. The significance difference in years of trading experience depicts new marketing actors are still emerging.

Table 2. Haricot Bean Marketing Actors Socio-Demographic Characteristics

Marketing Actors (Total N=110)	Sex	Age	Trading Experience (Years)
Farmer traders(N=19)	Male (Yes %)	100	36.12 (4.04)
	Female (%)	0	3.32 (3.45)
Rural Assemblers (N=38)	Male (Yes %)	89.22	29.37 (2.81)
	Female (Yes %)	10.78	4.71 (3.42)
Town Assemblers (N=18)	Male (Yes %)	100	34.31 (3.44)
	Female (Yes %)	0	6.47 (1.89)
City wholesalers (N=17)	Male (Yes %)	100	35.40 (3.63)
	Female (Yes %)	0	7.04 (3.03)
Processors (N=10)	Male (Yes %)	100	38 (3.61)
	Female (Yes %)	0	8.60 (2.51)
Exporters (N=8)	Male (Yes %)	91.98	37.21 (3.37)
	Female (Yes %)	8.02	7.61 (2.30)
	Male (Yes %)	100	38.82 (4.55)
	Female (Yes %)	0	7.82 (2.15)
F/ $\chi^2$ -Value		13.81*	4.93***
			11.04***

Note: \*\*\* and \* show statistical significance at less than 1 and 10% probability levels

Numbers in the parenthesis are standard deviations N=Sample size

Source: Survey result, 2012

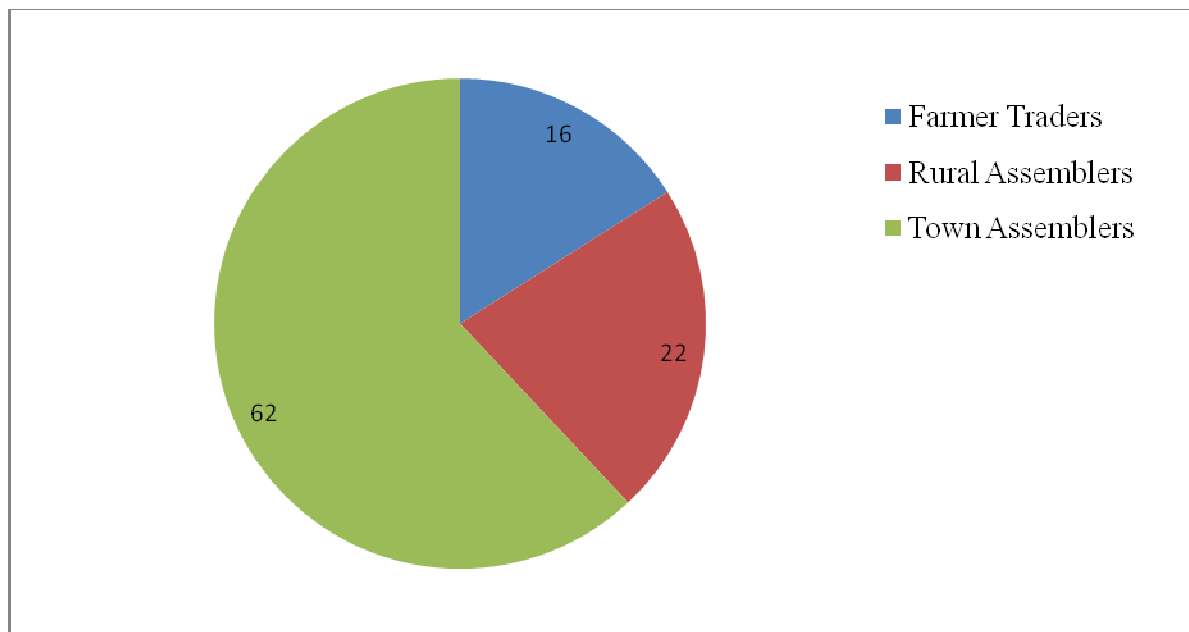


Fig. 1. Haricot bean market outlets of farmers (%)

*Note: Numbers inside the pie-chart represent percentage of haricot bean directly purchased from producers*

*Source: Survey result, 2011*

As depicted in Figure 1, the largest volume of the produce (62%) is assimilated by town assemblers. This is because these marketing actors collect and sell the commodity after some periods of storage. They continuously buy until better prices are set at destination (Addis Ababa) markets. This helps them make prices, control the market and earn profit easily.

### 3.1.2 Haricot bean marketing channels

Following the direction of flow and volume of haricot bean transacted, 7 marketing channels were identified. The channel starts from the producers and ends in consumers passing through a number of marketing actors along the chain. According to the Enebsie Sar Midir district agricultural office (2012) report, a total of 15,200 tons of haricot bean was produced by the year 2011 (Figure 2). Of this, the amount that was transacted during the year was found to be 13,468 tonnes. Because of the special nature of the commodity, the flow channel was found to be long and complicated. In order to quantify the volume of haricot bean handled by each marketing actor along the marketing chain, the total purchased amount was multiplied by the share of each marketing actor as obtained from the survey.

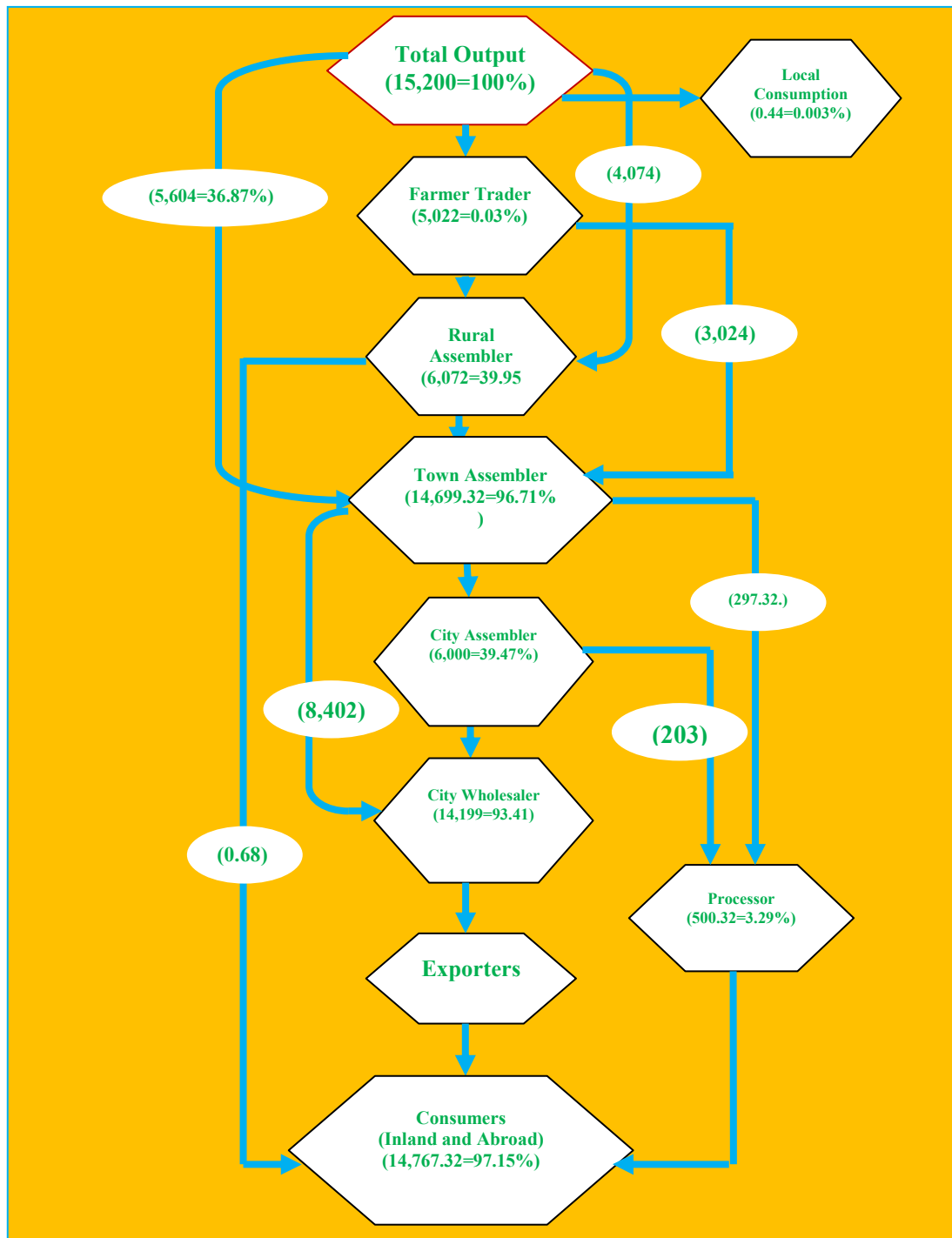


Fig. 2. Market Channels of haricot beans

Note: Numbers in the parentheses represent tons of haricot bean. The difference, 432.68 tons (15,200 tons-14,767.32 tons) is attributed to local consumption and losses due to pest and spoilage. Source: Own survey, 2012

### 3.2 Market Structure and Performance of Haricot Bean

#### 3.2.1 Market structure

##### 3.2.1.1 Entry barriers to the red haricot bean market

**Capital:** Capital was the primary barrier to enter haricot bean marketing. The survey result indicates that about 46% of farmer traders, 48% of rural assemblers and 41% of city wholesalers and 37% of exporters confirmed that capital is the primary factor that blocks many people from entering haricot bean marketing. Lack of guarantee to take credit from banks and unavailability of credit services has also contributed to financial scarcity.



The only available credit service in the district is the Amhara Credit Service Institute. But due to its high interest rate (18%), 62.08% farmer traders and about 47.56% town assemblers confirmed that they refuse to take credit from this credit service institution.

**Lack of training:** The survey result indicated that there has been no training or consultancy service provided to the marketing actors regarding haricot bean marketing. About 100% of farmer traders, 97% rural assemblers, 88% of city wholesalers and 81% of exporters showed a strong desire of taking training if provided.

**Education level:** The result indicated that in all marketing actors, less than 50% responded that they followed formal education. Price information, market prediction and addition of value to the product are functions of the literacy level. Of all the marketing actors, all the exporters were found to be literate (completed formal school of 12 grade) which agrees with the work of Tesfaw (2013).

### 3.2.1.2 Market concentration

Degree of market concentration in Mertulemariam and Addis Ababa showed that haricot bean is handled by few individuals and thus the haricot bean market is oligopolistic in nature. In the above regional markets, the 2011 annual volume of haricot bean purchased was taken in order to calculate the concentration ratio in the markets considered (Mertulemariam and Addis Ababa).

The concentration ratio had indicated the existence of oligopoly market structure in the three markets considered in different degrees (Table 3).

Table 3. Concentration ratio of the haricot bean markets considered

Markets	Concentration ratio for the four big firms (%)
Mertulemariam (Town Assemblers)	55.82
Addis Ababa (City Wholesalers)	66.42
Addis Ababa (Exporters)	44.11

Source: Own computation, 2012

As seen in Table 3, the four relatively big wholesalers (city wholesalers) in Addis Ababa took 66.42% which is an indication of a strong oligopoly market structure of the commodity followed by town assemblers in Mertulemariam having a share of 55.82% from the annual volume of haricot bean transacted (Kohl and Uhl, 1995). The amount taken by exporters in Addis Ababa is relatively smaller (44.11%) depicting weak oligopoly. In two market centres (Assemblers in Mertulemariam, Wholesalers in Addis Ababa), the commodity market is found to be strongly oligopolistic. This is because the existing number haricot bean traders is smaller due to entry barriers (mainly financial) to the market.

## 3.2.2 Marketing performance

### 3.2.2.1 Marketing margins

The marketing margins calculated for each marketing actor indicated that there was a large difference in the consumers' price spread along the marketing chain. Wider marketing margin indicates high price to consumers and low price to producers and it is an indicator of the existence of imperfect markets Cramer and Jensen (1982) noted that though markets may fail due to many reasons (Table 4).

Table 4. Marketing margins along the different marketing channels

Marketing Margins	1	2	3	4	5	6	7
TGMM	56.23	61.36	68.40	60.31	58.46	60.20	46.14
GMM <sub>ft</sub>	16.86	24.71	13.22		33.41	28.12	
GMM <sub>ras</sub>	22.20	16.54	14.31	11.54	17.53	16.37	19.25
GMM <sub>tas</sub>	36.23	34.12		29.81	32.19	30.81	29.77
GMM <sub>cws</sub>	38.60			10.61			
GMM <sub>prc</sub>				34.43			32.79
GMM <sub>exp</sub>	32.11		8.90	31.27	30.03	33.25	31.66
NMM <sub>ft</sub>	8.23			9.44		8.43	7.80
NMM <sub>ras</sub>	7.36	8.10			8.11		
NMM <sub>tas</sub>	7.54		7.64	7.88			7.98
NMM <sub>cws</sub>	7.21			8.97	10.32		8.46
NMM <sub>prc</sub>	11.52	7.67	7.12	10.20		9.71	11.00
NMM <sub>exp</sub>	8.93	7.83	7.65	8.00	8.74	10.43	9.11

Note: TGMM=Total Gross Marketing Margin, NMM=Net Marketing Margin, ft=Farmer Traders, ras=Rural Assemblers, tas=Town Assemblers, cws=City wholesalers, prc=Processors, exp= Exporters. Values in the table are % share of the final selling price. Values don not add up to make the TGMM as different selling prices were used

Source: Own computation, 2012

According to Cramer and Jensen (1982), wide marketing margins are evidences for the existence of inefficient

markets although high marketing margins can also arise due to high real marketing costs and a very big producer and consumer price difference.

### 3.2.2.2 Marketing profit

The marketing profit was quantified by subtracting the sum of purchase price and the marketing cost from the selling price for each marketing actor in each marketing channel.

The result revealed that profit was found to be highest (3.90 Birr/kg) for exporters in channels 1, 3,4 and 7 followed by processors (1.65 Birr/kg) in channel 3. Kindie (2007) noted that in his market chain analysis of sesame, noticed a similar trend. This is due to relatively high export prices (for exporters) and significant price increment after value addition (processing).

To the contrary, the least marketing profit (0.20 Birr/kg) for farmer traders, town assemblers and city wholesalers in channel 1 (Table 5). The reason may be attributed to high purchase price and relatively low selling price (due to high bargaining power buyers in the channel). The information obtained using RMA (Rapid Market Appraisal) indicated that these marketing actors incur high marketing costs (brokerage, transport, packaging and grading). The result also indicated that super imposition of unaffordable taxes to the town assemblers and city wholesalers is one of the reasons that made them incur big cost of haricot bean transaction.

Table 5. Marketing profit of haricot bean traders (Birr/kg) for selected channels

Marketing agents		1	3	4	7
Farmer traders	Purchase price	6.75	6.75		
	Marketing cost	0.55	0.55		
	Selling price	7.50	7.50		
	Marketing profit	0.20	0.20		
Rural Assemblers	Purchase price	7.50	7.50	7.00	
	Marketing cost	0.50	0.40	0.30	
	Selling price	8.25	8.50	8.55	
	Marketing profit	0.25	0.60	1.25	
Town Assemblers	Purchase price	8.25		8.25	7.10
	Marketing cost	0.35		0.35	0.40
	Selling price	8.80		8.80	8.30
	Marketing profit	0.20		0.20	0.80
City Wholesalers	Purchase price	8.80		8.80	8.80
	Marketing cost	0.30		0.35	0.35
	Selling price	9.30		9.30	9.30
	Marketing profit	0.20		0.15	0.15
Processors	Purchase price		8.25		
	Marketing cost		0.30		
	Selling price		10.20		
	Marketing profit		1.65		
Exporters	Purchase price	9.30	9.30	9.30	9.30
	Marketing cost	0.45	0.45	0.45	0.45
	Selling price	13.65	13.65	13.65	13.65
	Marketing profit	3.90	3.90	3.90	3.90

Note: The export prices are fob (free on board) prices

Source: Survey result, 2012

## 4. CONCLUSION AND RECOMMENDATIONS

Empowering producer households through creation of well designed market linkages and efficient marketing can help the intensification market oriented production of the commodity in Enebse Sar Midir District. The concentration ratio of the four relatively bigger firms indicated that there exist a strong oligopoly market structure depicting that the commodity is handled by few individuals (traders) and absence of completion which resulted in market inefficiencies.

There is a high demand for haricot bean for its nutritional importance to the ultimate consumers and for earning cash to the producers. In this regard, Enebse Sar Midir district is one of the main supply sources of haricot bean in Ethiopia (the annual production in the district for the year 2011 production season being 15,200 tons). However, most of the output is transacted and handled by few traders. Due to lack of financial capital, many traders failed to enter haricot bean marketing. All these factors contributed to the strongly oligopolistic nature of the commodity market and poor marketing performance and efficiency.

To empower producer farmers and many interested traders, there should be training and credit service



delivery which will ease the market entry. This will ultimately foster competition and improve the market structure.

In order to maintain sustainable supply of haricot bean in Enebse Sar Midir district, producer farmers have to be motivated with predetermined farm gate prices through hindering the influence of wholesalers in central markets. This can improve the profit share earned by producers and persuade farmers to produce and supply the commodity continuously.

This finding is generally a one season observation of the output in relation to the market transaction of haricot bean in a given location (Enebse Sar Midir ditrict) and thus in order to come up with conclusive findings and recommendations, further investigation ought to be executed with temporal and spatial disparities.

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