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Full Length Research Paper

Marketing practices and challenges of Mung Bean in Ethiopia Amhara Regional State: North Shewa Zone in focus

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Mung beans are grown widely for use as a human food (as dry beans or fresh sprouts), but can be used as a green manure crop and as forage for livestock. This study assessed the marketing practice and challenges of Mung bean in the Amhara Region, North Shewa Zone. Descriptive analysis techniques were used for conducting this research. From the nine selected districts, 1,350 producers, 115 traders and 10 experts/professionals were taken as a sample using convenience sampling techniques. The interviewer administered questionaire and field observations were employed for the fruit of this study. The finding showed that, although the North Shewa Zone has prospected potential in producing Mung bean and supplied to Ethiopia commodity exchange market, currently its production amount is low due to production and marketing challenges. The unpredictable rainfall, prevalence of pests and diseases, lack of input supply and development, and lack of proper storage and handling were among the identified production challenges. On the other hand, it is identified that low level of local consumption, inappropriate market chain, lack of market information, price impulsiveness, lack of stakeholder's commitment, limited market promotion and lack of finance were major marketing problems for Mung bean products. In line with this, season and quality were the main determining factors of the price of the product. Lower bargaining power of producers relative to traders makes them to earn less out of it.

Key words: Commodity market, Ethiopia commodity exchange, Mung Bean.

INTRODUCTION

As the theoretical and practical experiences teach us having efficient domestic agricultural commodity marketing system plays a decisive role in accelerating the growth and development of the agriculture sector. Add to this, it makes the participants in the value chain such as producers, traders, and ultimate consumers' beneficiary

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as per their role and efforts exerted in the system. For this and many more other reasons, the Ethiopian government strives to design agricultural policy to enhance motivation among the local farmers and be economical capable enough by minimize challenges of capacitating and provides agricultural production activities while cushioning consumers from price risk.

Ethiopia is sufficiently endowed with different natural and man-made resources that contributes a lot for continues development especially in the agricultural sector. It has also verities of climatic zones suitable for the production of a variety of exportable commodities to acquire foreign currency to support its sustainable development in sectors of the economy. Together with this the country tries to modernize agricultural marketing in the country; the ECX and ECEA (Ethiopia Commodity Exchange Authority) are playing their pivotal roles to expand the types and quantities of traded commodities like coffee haricot bean, sesame and currently try to register some other commodities through ECX. These include emerging commodities like Mung Bean Haricot beans, and Sesame, to mention a few.

Ethiopia Commodity Exchange (ECX) announces the entrance of a new commodity, Green Mung Bean, into its trade floor. Green Mung bean is the sixth product that ECX is trading. Coffee, sesame, white pea beans, maize and wheat have been traded in ECX so far. Studies show that 150,000 to 200,000 quintals of Mung bean, known in Amharic as 'Masho', is produced per year in Ethiopia. Mung bean is mostly produced in Amhara regional state particularly in some areas of North Shewa and South Wollo as well as in some woreda's of Benishangul Gumuz regional state. Though this being the case, Mkung bean like other food crops, the small and small cooperative farmers produce for personal and family consumption and sometimes for commercial purposes in the previous few years. Despite increases in the potential export market, Mung bean production at the country level is no considerable improvement in quantity as well as quality of production to provide it for the central market with the help of Ethiopia commodity exchange (ECX). Therefore, in this study attempts will be made to assess the marketing practices and challenges of cash crops with due emphasis on Mung bean, emerging commodity in ECX market.

THEORETICAL FRAME WORK

Even though organized and integrated commodity exchanges have a long history, for more than a century, it remained largely confined to industrialized nations. However, with market liberalization and increasingly affordable information technology since 1990, commodity exchanges have mushroomed around the world (UNCTAD, 2007). It is defined as an auction market where contracts on commodities are available for purchase or sale at an agreed price and for delivery on a specified date (Parvez, 2009). It is an association or a company or any other body corporate organizing trading in commodities for which license has been granted by regulating authority. As the theoretical experiences teach us having efficient domestic agricultural commodity marketing system plays a decisive role in accelerating the growth and development of the agriculture sector. Agricultural commodity exchanges market in Africa, launched shortly after market liberalization in the 1990s, but only South Africa succeeded in making its exchange sustainable. Despite the initial stage of success, Zambia and Zimbabwe suspended their operations following unusual price fluctuations and subsequent government intervention .Other exchanges established in the 1990s include the Kenyan Agricultural Commodity Exchange (KACE) which no longer support actual trades but exist with donor support and the Uganda Commodity Exchange (UCE) which does coordinate trades but not been able to attract sufficient trade volumes to be self-sustaining. Since 2004, more and more countries have been launching exchanges-notable ones include Malawi in 2004, Nigeria in 2006, Zambian exchange, ZAMACE, established in 2007 and the Ethiopian Commodity Exchange (ECX) in 2008 (Shahidur, 2010).

Ethiopia commodity exchange is anticipated, rewards quality services to producers and reduces transaction costs of market participation thus increasing returns to market activity. It enables quick capital turn around, increases market volumes, reduces risk related to counter party default and prices, increases market participation, increases information and transparency for all market actors (UNCTAD, 2005). The Agricultural Growth Program (AGP) is a major component of the growth and transformation plan (GTP) in the country level and its objective is to increase productivity and market access for key crop and livestock products with good potential for agricultural growth. It aims to achieve a greater balance between targeted supports to the poorest rural households in food insecure.

The growth and transformation plan (GTP) of Ethiopia consists of firstly, agricultural Production and Commercialization to strengthen the capacity of farmer organizations and their service providers to scale up best practices and adopt improved technologies in production and processing, and to strengthen marketing and processing of selected commodities through engagement with private sector stakeholders; secondly Small-scale Rural Infrastructure Development and Management to support construction, rehabilitation and/or improvement, management of small-scale rural infrastructure to improve productivity and further develop and increase the efficiency of key value chains through improved access to markets. The market prices so determined do not also sufficiently discriminate poor quality from good quality.

Standardized grading and quality differentiating system is also missing. Trade agreements between collectors, wholesalers and exporters are largely non-standard where either side can back out his or her promises without much difficulty (World Bank, 2010).

A set of constraints spans the pulses value-chain in production, aggregation and trading, and demand sinks/export. Productivity is below potential due to low input usage, especially chemical fertilizers inability to increase yields, limited availability of seed, limited familiarity with the variety of existing seed types, and limited usage of modern agronomic practices (Ferris and Kaganzi, 2008). The link between the producers and the export markets is weak, due to the large number of ineffective intermediaries operating in the value chain (Dawit, 2010). The fragmentation of intermediaries between the producer and consumer markets creates a lack of transparency in markets (Ferris and Kaganzi, 2008).

METHODOLOGY

The driving force for conducting this research was to assess the mung bean marketing potential and associated challenges in the framework of Amhara Region, with special emphasis on North Shewa Zone. To this effect, descriptive research method is used. To get safe and sound reliable information both qualitative and quantitative methods were employed (Bekele and Shiferaw, 2007).

Description of study area

North Shewa is one of the 10 zones in Amhara Region, Ethiopia. The name is also called Semien Shewa. It takes its name from the kingdom or former province of Shewa. The zone is bordered on the South and West by the Oromia Region, on the North by North Wollo, on the Northeast by the Oromia Zone, and on the east by the Afar Region. Based on the 2013 Census conducted by the Central Statistical Agency of Ethiopia (CSA), this zone has a total population of 1,837,490, an increase of 17.72% over the 2007 census, of whom 928,694 are men and 908,796 are women. It has an area of 15,936.13 square kilometers. Semien Shewa has a population density of 115.30. While 214,227 or 11.66% are urban inhabitants, a further 112 or 0.01% are pastoralists.

Sample size and sampling techniques

The total population of the study was farmers and traders who are in the commodity market chain. In the research area under consideration, North Shewa Zone, there are 27 Districts/woredas. Among these, only nine of them were selected purposively as the part of the study based on the number of producers of these cash crops, particularly, the Mung bean as well as their active participation in the market chain. With regard to the number of farmers, we took 150 farmers as a quota from each district and selected respondents by using convenience sampling techniques (a two stage non-probability sampling techniques). The logic behind was to make the samples more purposive and to get reliable and dependable information about the subject.

We took 115 (38 whole sellers and 77 retailers) traders who are engaged in the market chain from all selected districts. This is because the traders are not scattered in all districts and work throughout the region. In this particular study, the interviewer administered questionnaire, and interview guide was used as the major data collection instrument. The interviewer administered questionnaires were used to collect the intended information from the head of household as well as traders. In doing so, questionnaires were prepared in 'Amharic' since almost all respondents' mother tongue is Amharic. The detail of each instrument is presented as follows.

Interview guide

To gather the necessary and required information from the experts, we used interview as a means. It gives flexibility to the interviewer and allows one get the detail of the issue under investigation. It gives room for the experts to share their immense experiences on the issue (i.e. value chain analysis). In doing so, we chose the convenience time for the interviewee to avoided unnecessary burden and maintain their emotional stability while they are engaged in the interview

To achieve this mentioned objective, the researcher had collected and reviewed relevant documents and information from both primary and secondary sources. The primary data were collected through interviewer administered questionnaire from the commodity traders in different districts. Likewise, interviewer administered questionnaires were used to gather the data from farmer/producers.

Moreover, interview guide line was used to gather the required information from the experts in the district. The relevant secondary data were obtained from different literatures, journals, articles, and ministry of trade annual report forum paper, national and regional report documents at different time.

In the selected woredas, we interviewed 38 wholesalers, who have licensed for grain trading. Surprisingly, there are no traders who registered as a wholesaler to trade Mung bean independently. Thus, almost all those registered wholesalers have been trading mung bean together with other grains. For this study we interviewed 77 retailers from the nine selected Woreds. Regarding the brokers it is difficult to get a formal broker who works permanently rather he/she participates in the market chain as an informal mediator. We use projective techniques to identify them in the market and to get appropriate information from them.

The data gathering instruments employed in this study, (structured questionnaire and interviewee guide lines) were pilot tested in order to make essential corrections and maintain the validity of the instruments.

Accordingly, both instruments were revised based on suggestions and recommendations collected during pilot survey. After the data were collected, the researcher perused over certain successive procedures. Firstly, quantitative data collected through structured questionnaire were analyzed by using various feature of Statistical Package for Social Science (STATA) including frequency table, percentage, and graphs. And then the data collected through interview were analyzed qualitatively by combing with compatible questioners.

RESULT AND DISCUSSION

Socio-economic characteristics of the respondents

As stated in the methodology part of the paper, the study mainly depends on the primary data collected from nine District of North Shewa Zone respondents of two groups. These groups are farmers, who produce the commodity,

Table 1. Respondents experience in producing mung bean.

Starting years of producing mung bean	Respondents	
	No.	Percentage
<2 years	545	40.37
3-7 years	712	52.74
>8 years	93	6.89
Total	1,350	100

Source: Own Survey, 2014.

and traders, who participate in the trading activities of the commodities specifically in Mung Bean. The group of traders includes wholesaler, retailers and brokers. Each respondents group has its own socio-economic characteristics. This has been summarized as an entry point to the main objectives of the study. The difference of each group may arise from financial capacity on the share of the market, on their social situation; occupation, age group, sex, educational level, marital status, on the type of problems faced in the market, the distance from the market, information availability, weather condition to produce the commodities, etc. The socio- economic characteristics are discussed separately for each group.

The socio-economic characteristics of producers

Like any other areas of the country, in North Shewa zone the main activities of the farmers are producing different commodities which gave them optimal profit with regard to the production areas. In the selected nine districts, there was large number of households who produce various types of agricultural commodities such as Mung Bean, Haricot bean, Sesame, Teff, Onion, Potato, etc. For this study we take 1350 producer as sample respondents from the total population under the consideration area.

The majority (93.2%) of the respondents are male headed household while the remaining 6.8 percent were female headed household. This explicitly indicates that the vast majority of the household who are engaged in the production of the Mung bean are male dominated. This could be strongly linked with the cultural justification. To substantiate, in the rural part of Ethiopia most of the agricultural practices are performed by males (Hussien, 2009). Similarly, the interviewee, the value chain experts, in the zone stated that most of the rural cash crop production is handled by the male headed household. Moreover, the majority of them (55.04%) are uneducated and only 3.04 percent of them completed higher level of education. Regarding the marital status of the respondents 95.2 percent of them are married and the rest (4.6 percent) are single and widow.

Furthermore, most of the respondents are found on the age group of between 21 and 40, and their average family size is between 4 and 8. Producers are involved in producing different types of commodities like Mung bean, Haricot bean, Sesame, Onion, Teff, and other commodities based on the weather condition of each district (Table 1)

Regarding the production experience of mung bean, 52.74 percent of the respondents replied that they have 3-7 years of experience, while 40.3 percent disclosed that as they had less than two years of experience. The remaining 6.89 percent of the respondents had more than eight years of experience. From this we can figure out that the vast majority of the farmers/producers have short experience in producing and supplying mung bean to the market. Almost all participants explained that they started producing this commodity in the expense of other grain such as teff, sorghum, and wheat because of its comparative advantage.

There are different other commodities produced by the zone selected district farmers in addition to mung bean. As can be observed, many of the producers are producing other commodities in addition to mung bean such as teff, onion, sesame, haricot bean, and others like wheat, barley, maize, sorghum, tomato, etc. Although there are slight variations among districts on their production, the major agricultural commodities produced by the farmers in their order of importance are teff (35 %), onion (21%), sesame (15%), haricot bean (13%) and others (16%).

Production potential

Ethiopia endowed various agro ecological zones and diversified natural resources, which has been known as the home land and domestication of several crop plants. Pulse crops are important components of crop production in Ethiopia's smallholder's agriculture, providing an economic advantage to small farm holdings as an alternative source of income, and food security. Moreover, some of them have also played an important role in the export sector generating foreign currency for the country. The major varieties of pulses grown in Ethiopia are: Horse beans, chickpeas, haricot beans, lentils, dry peas, vetches and mung bean.

Mung bean is a recent introduction in Ethiopian pulse production grown in limited area in smaller quantity. It has green or yellow skin and sweet in flavor. It is drought resistant crop compared to other pulse crops. However, its consumption is not widespread like the other pulses in the country. Reliable information is lacking on the potential and actual production levels of mung bean at the national scale in Ethiopia. The main production areas of mung bean in Ethiopia are Amhara Region North, Shewa zone and some parts of Benishangul Gumuz.

Like any other part of Ethiopia, Amhara region North,

Figure 1. Zonal pulses and Mung Bean production trend from 1998-2006 E.C.

Shewa zone is endowed with varied agro ecological areas and rich in diversified natural resources. The small holders in the region cultivate several crop plants, including mung bean. Regarding the area coverage and production trend of mung bean from the year 1998 to 2006 E.C. in the study area is presented below in form of graphs. The unexpected changes of weather condition and the market price fluctuation have a significant contribution for the Mung bean area coverage fluctuations (Figure 1).

In 2004 E.C. there was a significant increment because of higher price expectation since there was high demand in the previous year. However, the area coverage declines after a year which is due to its price fluctuation and the area covered by other competitive commodities which gives high return to producers.

The production potential of agricultural products might measure and determined by the level of production per quintal and the level of crop productivity. Mung bean production and productivity level upturns from year to year, even if small growth rate, more specifically, from 2001 to 2003. But from 2004 onwards, the volume of production increases at fastest rate and it reaches to more than 130,000 quintals in 2006. However, the productivity remains below potential due to low input usage and bad weather conditions (Table 2).

This growth in Mung bean production in the region could mainly be attributed to improvement in productivity (increase yield per hectare) and partly due to good distribution and amount of rainfall. The expanding of area coverage also contributes for the growth of Mung bean production in the region.

Marketing chain

The market supply of Mung bean starts from small farmers. This supply does not pass directly from producer to the final consumer. Rather it is separated from the demand of consumers in time, place, form and size of the product. As defined by Swamy et al. (1999), marketing is the performance of business activities that direct the flows of goods and services from the producer to consumers. The major market participants identified in Mung bean marketing in North Shewa zone are producers, local assemblers, wholesalers, brokers and retailers. There are no large scale farms in the regions producing this commodity. That means small holder producers are the only suppliers of mung bean.

Farm traders are the main buyers of the grain in the country side. Trading is a part time job for the purpose of gaining additional source of income. Assemblers play an important role in the marketing system by pushing up the produce from the remote rural surplus markets to the towns, deficit areas and urban centers where the produce is demanded. Wholesalers are the central figure in the market channel. By definition the wholesalers of the given commodity are involved in wholesale trade, rarely selling directly to consumers. But in mung bean marketing, in the area the job of wholesalers and retailers is mixed up.

Table 2. Zonal mung bean area coverage, production and productivity.

Year	Zone_Mung_Area/hec	Zone_Mung Production	Mung bean productivity
1998	2.75	8.25	3
1999	1,853.60	28,890.50	15.59
2000	2438	18349.28	7.53
2001	540.875	6060.4	11.20
2002	304.7	2069.75	6.79
2003	772.36	11490.71	14.88
2004	7518.37	108975.9	14.49
2005	5015.85	71802.55	14.32
2006	7086.99	107519.7	15.17

Hence, traders licensed as 'retailers' are doing the wholesaling activities too, and traders licensed as 'wholesalers' are doing the job of retailers seriously. This is probably due to fear of high income taxes, as traders assume they will be levied less tax if they say that they are retailers. The mung bean wholesalers get their supplies from producers, assemblers and from retailers and working with a combination of other grain. These are the major actors involved in the transaction of mung bean; among the possibilities the following is the possible channels in the market,

Producer – consumer
Producer –Retailer- consumer
Producer –Assembler-Wholesaler-consumer
Producer –Assembler-Wholesaler-Retailer – consumer
Producer –Assembler- Retailer – consumer
Producer –Agent -Wholesaler-Retailer – consumer
Producer –Primary (regional) Wholesaler-Secondary (Terminal Market) Wholesaler - Retailer – consumer
Producer –Assembler-Wholesaler-Exporter
Producer -Wholesaler-Miller (Processor) - consumer
Producer –Primary crop –Secondary Crops/ Unions - Retailers – consumers

Price determinant factors in mung bean marketing

While the objective of any seller is to realize as a high price as possible, the objective of a buyer is to purchase the commodity at the lowest possible price. In open market economy, the market governs this two conflicting interests. The market determines the value of agricultural products based on the prevailing supply and demand condition. However, it was observed during the study and the previous studies of Muhammed 2006) and Addisu (2004) that there is no single price for the commodity, rather several factors co-exist due to a multitude of factors such as season (time of selling), quality of the product, sales location and functioning of the market, etc.

The major price determinant factors in mung bean, sesame and haricot bean marketing are season and quality. The majority (55.26%) of wholesalers, 54.55% of retailers and 54.74% of producers pointed out that season is the major factors that determine the price of those commodities. It was observed that the lowest price season of Mung Bean is the period where a glut in the market is created (Sep- Nov) and (Jan-march) and the highest price season is [June-Aug] where the supply is less in the market. This is in line with other grain market studies of Gebremaskel et al. (2008) that farmers sell 75-80 percent of their marketable surplus immediately after harvesting their product. This is due to the need for cash to repay their input loan and for other cash requirements such as wedding expenses, taxes and down payments for acquiring inputs for the next crop season. Therefore, this market behavior creates a surplus in the market there by pushing prices down to the lowest point. While there is shortage, the price rises up to the highest point.

The second major price determinant factor of Mung bean, Haricot Bean and Sesame (MHS) in the market is quality. According to proclamation No. 102 of 198, quality is defined as the totality of characteristics of an entity that bear on its ability to satisfy stated or implied needs. Different qualities have different prices. According to the respondents, for instance, larger grain sized Mung bean has higher prices as compared to small seeded grain size. Almost all farmers in the North Shewa Zone produce and provide green Mung bean to the market which has relatively better quality than other part of supplying areas in the country (i.e. yellow color Mung bean at Benshangul-Gumuz regional state).

The empirical analysis indicates that buyers of the commodity especially in grain market set various criteria for selection of the product in the market. Among those criteria, the dominant characteristics are identified as a grain size, grain color, test and other elements like purity (does not mix with other unnecessary things). Likewise, in the Mung bean market it was observed that traders consider seriously three parameters to identify the quality

of the commodity namely, color, grain size and foreign matter (purity).

Producers replied about the criteria used by their buyers or traders when they sell their commodity in the market. In this respect, foreign matter (mix of soil and stone), the size of the grain and color of the commodity have shares of 37.93, 31.56 and 30.51% to determine the quality of the product, respectively. On the other hand, retailers replied that they used grain size, color and foreign matter as a criterion when they buy the product which constitutes 37.66, 33.77 and 28.57%, respectively. These imply that having pure, large grain size and green color makes the mung been more preferable in the market. In other words, having and providing the commodity with good quality will increase the price of mung bean. However, during the field study we have observed harvesting and storing problems that directly or indirectly affect the quality of the product which in turn affect the income of the producers through lowering the price.

Challenges of mung bean: Production and marketing

As many studies indicate, Ethiopia has favorable ecological factors such as suitable altitude, ample rainfall and optimum temperatures, appropriate planting materials, and fertile soil which is a fertile ground to produce variety crop types. However, following subsistence farming system under rain fed conditions makes Ethiopia among food insecure countries for several years. Despite the potentials of Mung bean production in the region there are several factors which affect the production and marketing of Mung bean. Under this section, we would like to present the main problems which were obtained from respondents and field observations.

Production challenges

The major challenges of Mung bean in North Shewa zone from production perspective are to be discussed in detail as below.

Unpredictable rainfall

The majority of the farmers/producers stated that the productivity of those commodities is highly dependent on the amount and distribution of rainfall. Indeed, the amount of rainfall required to produce Mung bean is lower than the minimum requirement of rainfall for other crops. However, the amount and distribution of rainfall is irregular and sometimes unfavorable for Mung bean production. Hence, such unfavorable rainfall challenged the production of Mung bean in terms of amount and quality. To this end, one farmer stated the aforementioned issue as below:

……..in 2004 I have covered one third of my land by mung bean with a great expectation of a good payoff which helps me to cover children educational costs (e.g. uniform, exercise book). But due to unpredictable rainfall I lost almost all what I expected at the end of the season. This incident made me pessimist with Mung bean production payoffs. For this reason, I significantly reduced land coverage of Mung bean and add other crops to mitigate the risk ……..

Experts also expressed that most of the farmers do not use irrigation for producing Mung bean and other crops. Therefore, the concerned body should promote the use of other alternatives like irrigation system where it is possible to tackle the problem of unfavorable rainfall. Thus, the usage of other source of water would alleviate the problem faced by farmers which will improve the production of crops both in terms of amount and quality.

Prevalence of pests and diseases

Another important challenge of mung bean production is related to pests and diseases. Hence, the occurrence of such crop pests and diseases would affect the productivity and quality of Mung bean. This problem can be severe when the availability of pesticides is limited. In this regard, the interviewees stated that accessibility of pest sites significantly affect the production of those commodities in the area. Further they noted that the negative impact of pest and disease in the zone is lower than the impact of unpredictable rainfall. Likewise, the discussant noted, for the time being, pest and other related crop diseases are to be a potential problem of mung bean production.

In this respect, the expertise disclosed that most of the time farmers do not use pesticides as well as other protective mechanisms to prevent the negative impacts of pests and diseases associated with producing the Mung bean. Nevertheless, professionals in each district were trying to persuade farmers to use pesticides and other related techniques to lower their fear as well as to enhance the volume of production and quality of mung bean and other crops produced by the farmers.

Lack of input supply and development

Obviously, the production of crops is highly contingent on the availability of improved inputs like seed, fertilizer, and so on. However, very little efforts were made to improve commodity varieties by agricultural research institutes particularly on Mung bean. As compared to Mung bean,

sesame and haricot bean give a recovering consideration in identification of seed verities in various agricultural research institutions to mend productivity and to win massive external competition.

Furthermore, extensive extension service does not exist for Mung bean to enhance its productivity as well as its quality. In this regard, farmers and experts ascertained that Mung bean is produced in the very traditional way. Besides, the availability of essential farming inputs like fertilizers and improved seeds is limited. These are among the shortfalls of mung bean production contrary to its economic contribution. Therefore, the concerned bodies should strive to modernize the production method and to enhance the availability of essential inputs to maximize the level of output. As it can be observed from the data, the majority (84%) of the respondents disagreed on availability of the essential inputs for Mung bean production. This result supports the above remark that we made.

Lack of proper storage and handling

According to Self-Help Africa it is important to focus on improving post-harvest activities such as collecting, storage and handling to improve the quality of Mung bean. This in turn help farmers to have a substantial bargaining power in the market and for a better market return.

By doing so, the small farmers will have a chance to uplift their scale of operation in the long run. However, the responses indicated that the usage of proper storage by farmers is around 51 percent. This implies that almost half of the producers do not have proper storage and handling. This is partly because they do not have the knowledge of proper storage and its impact on the quality as well as marketability of Mung bean. Similarly, the majority (75.6%) of the trader also disagreed with the statement that there are enough storage facilities for Mung bean and other commodities. For more information on this issue one can refer to Table 2.

Furthermore, the interviewees also explained that due to lack of well-organized warehouse/store they used to store somewhere in their home in congested manner. For instance, a certain amount of the products are exposed to excessive sun light as well as rain falls. As a result, its quality become deteriorates and may not be preferred by traders. Consistently, the discussant also expressed that there is a shortage of storage space which is a considerable problem for the producers and traders.

Marketing challenges

Obviously proper marketing for commodities is crucial for the benefit of market participants such as producers, traders and the final consumers. Therefore, identifying problems linked to the marketing of Mung bean helps to design and implement efficient marketing strategies. To this end, various marketing issues were included in the survey. Thus, the major problems like low level of local consumption, poor coordination among traders, extended market chain, lack of market information, price impulsiveness, lack of market promotion, and lack of commitment will be presented hereafter.

Low level of local consumption

The level of consumption for a certain commodity is one of the determining factors for its production. However, level of consumption is driven by other factors like the value of the commodity and the knowledge of such value by consumers and others. Indeed, the nutritional value of Mung bean is substantial as it can be seen in Figure 2.

The food science experts indicated that Mung bean is rich in vitamins protein minerals. Moreover, some studies acknowledged that this crop is rich in fiber which is important to decrease cholesterol in blood that would expose people to heart attack.

Although the nutritional value of Mung bean is high currently it has low level of consumption in the local market. This is partly because the product is not widely known by the local people. Even producers do not know its nutritional content and how to use it. This awareness problem is responsible for low level of demand in the local market. Hence, when producers produce more output given low local demand make them to hold the product for long time which in turn leads to the deterioration in the quality of the product. For this reason, producers earn less income as low quality of product is reflected in the price. This forces producers to produce less of it.

When we come to the usage of the product producers used it for food in traditional ways mostly as boiled Mung bean. However, it can be used for food in different ways and for non-food purposes. For instance, in some countries of Asia it is used as cosmetics to beautify and protect skin in the face by preparing a powder from it. All in all, promotion seems very necessary to increase its demand locally that would imitate producers to produce more output and improve the income of market participants.

Inappropriate market chain

A successful and sustainable pulse presupposes that value chain actors were well integrated and function as a unified system in a way that maximizes the welfare of all actors involved from production up to consumption. The mung bean value chain in the study area, however, was far from efficient and fraught with several challenges.

Apparently, the experts indicated that most commodity

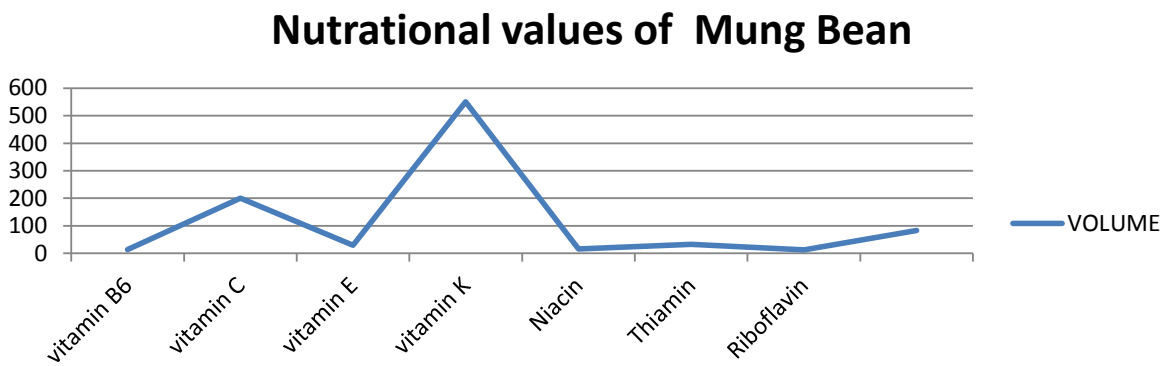

Figure 2. Nutritional contents of Mung bean. Source: Emmanuel Development Association (EDA) in 2010.

traders (individuals, associations and cooperatives) were not part of a formal trading organization like ECX. Consequently, very poor business coordination amongst traders has been observed. It was difficult for these informal traders to gather information and access various opportunities. Moreover, these traders are seasonal and trade more than one type of commodities in addition to Mung bean. Furthermore, the experts disclosed that these traders are not formally registered for Mung bean trading. Due to this, traders are irresponsibly bid lower price for producers by weakening their bargaining power. As a result, the brokers and agents were reaping more profit margins from the sales of Mung bean than the producers.

Furthermore, as per the responses from interviewees the market chain arrangements for those commodities uptight with several challenges like the existing extended marketing channels coupled with poor interventions that can improve the performance of the chain in the current marketing structure. Besides, they indicated that there are various marketing actors formally and informally engaged especially in Mung bean marketing.

The extended supply (value) chain of Mung bean reduced the profit margin of producers and thereby hindered their incentive to produce more. The quality of the product was reduced through excessive handling. Obviously, quality of the commodity was an important parameter that determines the price. In most cases, exporters reject substantial amount of commodities with low quality based on their quality standards, which impinges both the profitability of exporters and ultimately the prices paid to farmers.

The demand signal was lessened due to the multiple middlemen that make producers unknowledgeable about the preferable quality and the level of demand for the product in end markets. Therefore, the presence of formal and specialized Mung bean traders is necessary for the benefit of market participants. Furthermore, the producer pointed out that establishing separate market center for Mung bean product helps them to figure out the correct information which increases the bargaining power of the producers. Besides, it was important to differentiate and control the licensed traders from informal traders.

Lack of market information

Farmers and traders had been unable to access regular market information. This had been considered to be a major problem in developing marketing plans and in price discovery. This lack of information has been increasing both in transaction cost and resistance to risk taking. All market chain actors argue that a simple price and volume information system based on the key trading towns would make a considerable difference in their marketing decision making. Smallholder producers remained in a low bargaining position due to the absence of market information on the current status of local and international price. Regarding this issue, respondents from the two groups farmers and traders rated the availability of market information particularly price information.

The majority (53%) of the producers and 44% of traders disagreed on the availability of market information. That is enough to determine the product price. However, 16 and 37% of the producers and traders agreed that market information is available, respectively. It implies that, taking the variation among selected areas into account, in the study area there is information gap among market participants which opens a great opportunity for those who have better information especially for some traders. This leads market inefficiency.

Price impulsiveness

Recent shifts in prices and demand for commodities had led to increased risk and volatility in both prices and volumes of traded commodities. The commodity market

data shows that the prices and the volume of the commodity were fluctuating. The decision that was made without enough information on stock levels resulted in a wrong speculation of price that exposed farmers and wholesales for price risks. For instance, in a recent field trip assessment held in Amhara region, it was learned that cooperative unions and private traders of sesame purchased the product immediately after the harvest season at a high price based on last year's price; but the price was reduced thereafter. This has resulted in holding back of the produce and their capital was tied up. Price dictation by the brokers in sesame and holding back of produces by regional enterprises during peak season could not enable benefit from very good sesame price on international market.

Lack of stakeholder's commitment

Previously, we sort out some challenges like absence of mung bean market center, the participation of informal traders, less local demand for the product, not traded in ECX, and so on. These all indicate that there is a long way to go to make mung bean production and marketing better for market participants in particular and for the nation at large. Moreover, lack of enough support from officials to formalize the trading activities that reduce uncertainty in the market for the advantage of the farmer and trading community.

In support of the above idea there were open ended questions included in the survey to seek the degree of stakeholder's involvement for the benefit of producers and traders. In this regard, stakeholders like Emmanuel Development Association (EDA) and ECX have done some work. However, the respondents mentioned the limitations of stakeholders' involvement as below. There is very little support from the government side particularly agricultural sector in providing the necessary inputs. Despite ECX and EDA limited participation they still do not accomplish enough work for the betterment of Mung bean producers and traders. The trade office at woreda level has not done enough to bring informal traders in to formal.

Limited market promotion

Market promotion is essential to boost demand that would motivate both producers and traders to have a larger market base. However, the promotion on agri-cultural products particularly in Mung bean is considerably low. Here, we should bear in mind that Mung bean is not widely known by local people making; it is less demanded in local market. To this end, the respondents disclosed that there are efforts made by Non-Governmental Organization, Emmanuel Development Association (EDA) to diversify Mung bean usage as a food. A case in point, EDA to break the consumer resistance and bring the paradigm shift in the consumption culture; it exhibited the product by preparing as a soup, boiled, sprouted, and cooked. However, this effort is not enough to bring more demand. Thus, other stakeholders should also try to promote Mung bean to create more demand for it.

CONCLUSION AND IMPLICATIONS

Producers/farmers produced and handled the Mung bean through the traditional way without getting technical assistance from the professionals. They did not use modern agricultural inputs such as quality and improved seed, pesticides, and appropriate fertilizers. These directly or indirectly affect the quality of the product and its productivity. Due to this reason, the farmers lose their bargaining power in market and do not get what they deserve.

In the existing Mung bean market, there is no efficient and productive system that supports the farmers to improve the livelihood as well as to obtain the value what the market offers and these expose them to deal with the illicit traders. As a result of this, informal traders/ brokers got the wide opportunity to manipulate the market and set unfair price that discourages the producers and makes highly beneficiary from the informal trade. This practice would result in a repercussion not only on the farmers' fate but also on the competitiveness of the nation in the international market. Due to lack of appropriate market information, farmers were not selling their products according to the market price. They did not produce or get involved in market oriented production that would help them to tap the market opportunity as it could and should be.

The mung bean marketing system and market chain should be productive to bring considerable change on the marketability of the product and the productivity. Accordingly, the following recommendations were drawn.

1. Provide agricultural inputs to improve productivity: The Zone Agricultural Office along with the practitioner and non-governmental organizations should provide the necessary capacity building program for all stakeholders in the market chain with respect to providing and using selected seed types, fertilizers, pesticides, etc.
2. Improve bonds between traders and farmers: All concerned parties at all levels should exert their effort to develop a win - win relationship between producers and buyers; in doing so, empowering the farmers by providing timely and accurate market information regarding the price, quality of product, and alternative market.
3. Develop Market access to producers: The Regional and Zonal trade office collaborated with Ethiopia Commodity Exchange Authority and Ethiopia Commodity

Exchange (ECX) should widen the market opportunity in the local as well as international by promoting the products' using various promotional Medias.

4. The government must reinforce and motivate export: Evolving the export sector will motivate foreign exchange earnings and will create a stable demand pull of this type of commodities, thereby acting as a catalyst for the export sector. Exporters should be supported through creating conducive business environment aimed at bolstering exporters' scale, knowledge base, as well as business awareness.

5. The marketing chain should be re- arranged: An extended and unnecessary marketing channels crates cost for the participants in the commodity sector. So it is important to minimize the channel which is value added for any of the market participants.

6. The negative implications of a complex marketing chain are that (a) the quality of the product is reduced through excessive handling and (b) the demand signal is lessened due to the multiple middlemen separating producers and users so smallholders are unknowledge-able about the quality and type demands in end markets.

7. The relatively market actors working in a highly fragmented manner, coupled with lack of awareness of the inability for large-scale traders to track products implies high transaction costs for aggregators and traders.

Therefore, the presence of formal and specialized Mung bean traders who make membership sit in Ethiopian Commodity Exchange (ECX) as well as in the local market gives advantages to producers.

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Conflict of Interests

The authors have not declared any conflict of interests.

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Market supply determinants of lowland bamboo culms: The case of Homosha district, Northwestern Ethiopia

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Bamboo market in Ethiopia is not well developed and bamboo marketing as a viable alternative for farmers has become a very challenging issue. In the Homosha district, despite the abundant and valuable lowland bamboo resources, the income contribution of bamboo is very low and livelihood of smallholder farmers in the area is desperate due marketing challenges. Thus, the study was initiated to identify and analyze factors influencing bamboo culm market supply as well as its opportunities and challenges. Both primary and secondary data were used in this study. The primary data were collected from 141 household heads in three villages via household survey, key informant interviews, field observation, market assessment and stakeholder consultation workshop. The data were analyzed using STATA13. It was found that family size (in working age) and experience of culm selling were positively and significantly related to quantity of bamboo bundles supplied for sale at 5% significance level, whereas, education level, access to market information, marketing linkages and prices were positively and significantly related to quantity of bamboo bundles supplied for sale at 1% significance level. But, age of harvesters is significantly and negatively related to quantity of bamboo bundles supplied for sale at 5%. In spite of high bamboo resource in Homosha district, it is declining due natural and anthropogenic related activities. Reverse to this government and non-governmental organizations are working on rehabilitation activities in some areas of the district. Bamboo utilization is confined to household level and products are manufactured traditionally and there was a low local demand for these bamboo products. Market actor lack training and is few researches conducted on bamboo production, processing and utilization. Therefore, in addition to toughening interaction among harvesters and buyers, spreading of relevant information and establishing bamboo product market center and cooperatives, and engagement of relevant institutions to assist bamboo marketing, it is encouraged to train market actors on bamboo economic benefits and marketing as well as conduct research on production, processing, management and utilization.

Key words: Bamboo bundles, determinants, harvesters, marketing linkages.

INTRODUCTION

Non-timber forest products have long contributed to subsistence needs offering energy, food, other materials and cultural objects (Ingram, 2010). Bamboo is one of the non-timber forest products (NTFPs) and it is the fastest

growing and highest yielding renewable resource (INBAR, 2006). The highest diversity and area coverage of bamboos is recorded from the Asian continent, followed by the America and Africa continent (Inga and Camille, 2011). Ethiopia has only two native bamboo species, viz., lowland bamboo (*Oxythenanthera abyssinica* [A. Richard] Munro) and highland bamboo (*Yushania alpine* [K. Schumann] Lin) which was formerly named as *Arundinaria alpine* (strake, 2014). Bamboo meets a rising and diverse consumer demands and generates income and contribute to reforestation and climate change mitigation due to its fast growth and environmentally friendly character (Pabuayon, 2009; Lobovikov et al., 2011). However, there is no accurate data on area coverage of Ethiopian bamboo resources (Strake, 2014). According to INBAR (2011), Ethiopia has over one million hectares bamboo resources in Africa.

From this lowland bamboo covers 850,000 hectares, while highland bamboo covers 350,000 hectares (INBAR, 2011). It is noted that Benishangul Gumuz region comprises about 48% of the total lowland bamboo resources of the country. The region is identified as an area with the largest natural stands of lowland bamboo.

The very difference of the two native Ethiopian bamboos is as shown in Figure 1. The lowland bamboo has a completely solid culm, with high bulk density and greater stability, while the highland bamboo has a hollow culm, which is easier to process (Stake, 2014).

In Ethiopia, bamboo utilization is limited to house construction, fences and some rudimentary furniture and household utensils as well as bamboo resources and products are currently not properly managed and utilized (INBAR, 2007). Development of bamboo resources and marketing system requires a good understanding of factors affecting decisions to engage, develop, and benefit from the bamboo resources across the major bamboo-growing regions (Adnew and Statz, 2007; Andargachew, 2008). Such understanding could facilitate sustainable utilization and management of the ever-declining bamboo forests which enhance the penetration of smallholder producers into the markets through increased market information and access, value adding, forging of partnerships, and proportional share of prices for bamboo products and eventually improves bamboo product marketing system. However, there is no adequate information on factors influencing market supply of bamboo culms in region in general and specifically in Homosha district.

This study, therefore, was initiated to analyze determinants of market supply for lowland bamboo culms in Homosha district. Specifically, the study aims: (i) to identify socioeconomic determinants for lowland bamboo culm market supply and (ii) to assess prospects and challenges in bamboo culm marketing and management in the study area. In coming up with these objectives, detailed explanations of bamboo culm market supply determinants, management activities as well as opportunities and challenges in bamboo culm marketing were provided. Addressing these research objectives will offer knowledge concerning the determinants of bamboo culm market supply as well as the constraints and opportunities in bamboo culm marketing that will support to meliorate bamboo culm marketing system. Thus, this paper contributes to the understanding of wider issues regarding socioeconomic determinants of bamboo culm market supply, management activities as well as destinies and restraints in marketing of lowland bamboo culm in Ethiopia and further.

Figure 1. Transversal section of highland bamboo *Yushania alpina* (left) and lowland bamboo *Oxythenanthera abyssinica* (Starke, 2014: 3).

METHODOLOGY

Study area description

The study was conducted in Homosha district in Asosa zone, Benishangul Gumuz Regional State (BGRS). The district is located at a distance of 711 km from Addis Ababa to Northwestern. The total land area of the district is 48,325 hectares which comprised 15 rural villages. Data collection for the study was carried out in three rural village, viz., Tumet, Ashura and Jima (Figure 2).

Data collection methods

A multi-stage sampling technique was employed. First the study area was selected purposively based on the availability of bamboo resources. Second, three villages, namely, Tumet, Ashura and Jima were selected for the study based on the intensity of harvesting and level of bamboo marketing activities. Thirdly, households were selected randomly as all households in the study area harvest bamboo for domestic use and/or for sale (Fayera et al., 2016). In addition to secondary sources, primary data were gathered through household survey, key informant interviews, field observation, market assessment and stakeholder consultation workshop.

Different socioeconomic variables were determining the quantity of bamboo culm bundles[1] supplied for sale. Taking the number of

[1]Bundle refers to bamboo culms tied together, one bundle contains ten single bamboo culms and it is locally known.

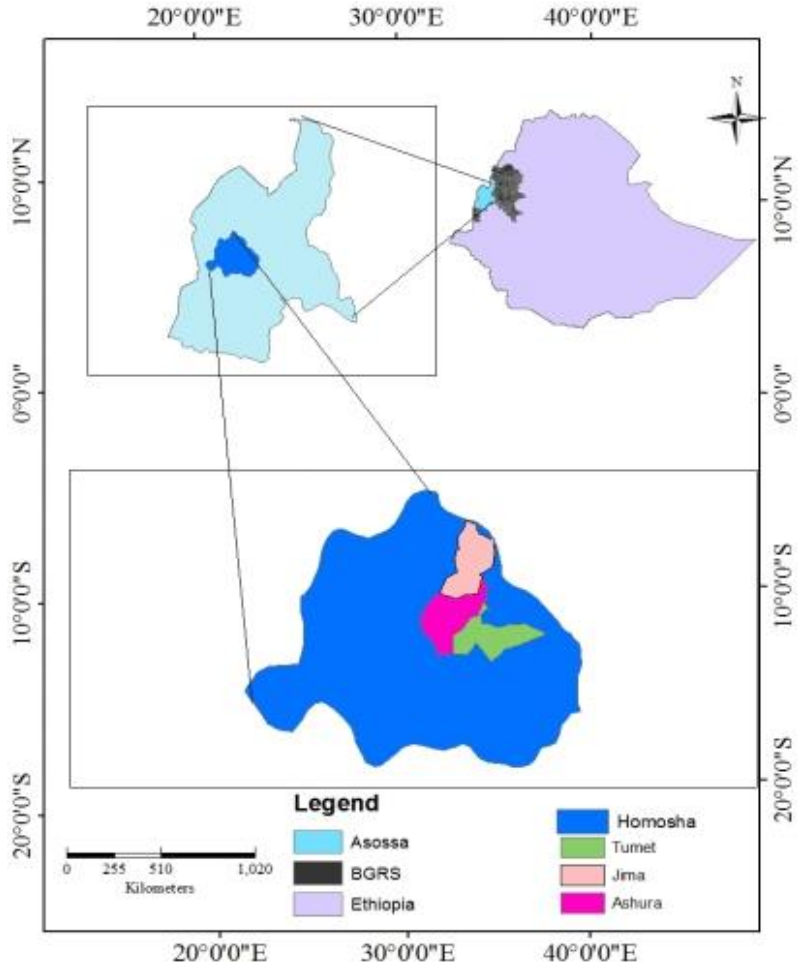

Figure 2. Map of study area.

expected explanatory variables into consideration, the sample size was determined by rule of thumb suggested by Greene (2003);

$N \geq 50 + 8\ m$

where N is the sample size and 'm' is the number of explanatory variables.

Eleven variables are hypothesized to determine bamboo culm supply for sale. Accordingly, using the household list, 141 respondents (household heads) were selected for interview (Table 1). Analysis was conducted using a combination econometric methods and descriptive statistics.

Market supply determinants

Market supply determinants refer to factors that hinder the ability of producers to supply their products to the market. The most important market supply determinant factors are divided into economic and political factors. Economic factors include product price, provision of consumer goods, production cost and market supply costs and political factors include the level of government intervention. In agriculture, supply is the function major factor affecting farmers' willingness and ability to supply agricultural products. These factors include (a) price of the commodity to be supplied, (b) cost of all the inputs necessary to produce the commodity, (c) net income or profit that could be had from alternative crops, (d) state of technology that affects potential yields, (e) total acreage available, (f) expectations about future price changes, and (g) risks to production (weather, insects). In this study of bamboo culm market supply was determined by econometric method.

In Ethiopia, bamboo harvesting is legal, but the market is weak due to low quality products, and poor coordination among agents

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Table 1. Sample size distribution of bamboo harvester households in the selected villages (Survey Result, 2014).

Name of village	Number of households	Number of sample households
Tumet	223	70
Ashura	108	34
Jima	119	37
Total	450	141

Table 2. Socioeconomic characteristics of respondents (categorical variables).

Variable	Variable description	Frequency (N=141)	%
Sex	Male	107	75.9
	Female	43	24.1
Access to extension services	No	60	42.6
	Yes	81	57.4
Marketing linkage	No	124	87.9
	Yes	17	12.1
Access to market information	No	86	61
	Yes	55	39
Education level	Not attended formal education	60	42.6
	Attended primary education (1-8 grade)	59	41.8
	Attended secondary education (9-12 grade)	22	15.6
Marital status	Married	127	90.1
	Single	14	9.9

N is sample size.

involved in the marketing chain (Andargatchew, 2008). In addition, few incentives exist for sustainable management of native bamboo forests; degradation and land conversion have resulted in a significant loss of bamboo forests and resources throughout Ethiopia (Andargatchew, 2008). In Ethiopia, bamboo product marketing and demand is growing, but the market potential is restricted because local entrepreneurs and rural households have not been successfully incorporated into this emerging market.

Model specification

Multiple linear regression model is applied to determine two or more factors affecting dependent variable. Thus, multiple linear regression is used to identify the relationship between quantity of bamboo culm bundles supplied for sale (dependent variable) and independent variables (Table 2). General form of multiple linear regression is:

$$Y= \beta_o + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \ldots + \beta_4 X_k + \varepsilon i$$

where Y represents dependent variable and X_1, X_2, X_3, X4…X_k represent independent or explanatory variables and εi represents disturbance factor.

Variable descriptions and hypothesis

Different socioeconomic factors are considered in this study that is supposed to affect willingness and ability to supply and sell bamboo poles. Each of the hypothesized explanatory variables are described subsequently and summarized in Table 2 at the end of this subsection.

Number of bamboo pole bundles supplied for sale (NBPBS): This is a dependent variable. It indicates the number of bamboo pole bundles supplied for sale in the year 2014 by harvesters.

Sex of household head (SEX): This is dummy variable which is 1 household head who supply bamboo pole for sale and is male and zero otherwise. Both male and female headed households involve in bamboo supply for sale, but male headed households might have better tendency than female headed households. Thus, it is hypothesized that male harvesters supply more bamboo poles than female headed households. NTFPs marketing are dominated by

women. However, the sale of some wild food products grass-cutters and other plant products (rattans, bamboo, hides and skins) and other wild animal products are dominated by men (Albert and Emmanuel, 2011).

Age of household head (AGE): It is a discrete variable and measured in years. It is hypothesized that older households supply less bamboo pole bundles for sale and it is expected to have a negative relationship with number of bamboo pole bundles supplied for sale.

Family size household (FASI): This is a discrete variable that refers to number of family members of greater than 15 years old in the household and expected to have a positive relationship with the supply of bamboo pole bundles for sale. Therefore, as the working labor of family increases the quantity of bamboo pole bundles supplied to the market will increase. Family with large working labour has sufficient labor to transport bamboo poles from distant forests, required in excess for household consumption, and such families may be motivated to sell what is left from their own consumption (Tefera et al., 2013).

Education level (EDULEV): It is a discrete variable measured by years of schooling. It is hypothesized that educated household heads supplies more bamboo pole bundles for sale. The educated household tries to diversify income sources. Therefore, it has positive influence on the bamboo poles supplied for sale. In Masha (Sheka zone of SNNPR) farmers who engaged in bamboo trading and harvesting were better educated and had access to market information (Tefera et al., 2013). Their knowledge and information positioning may help them to benefit from market opportunities available in the in the area.

Experience of household head (EXPER): This refers to the number of years the harvester participated in supplying bamboo poles for sale. It is expected to be related positively to the number of bamboo pole bundles supplied for sale. As farmers got more experience in bamboo selling, the probability of increasing supply would be higher. The more years of experience for a given seller increases supply and seller has the more he would learn about how the market works (Bauch and Sills, 2007).

Access to extension services (AEXSER): This dummy variable taking value of 1 if bamboo pole supplier has contacted with a development agent and 0 otherwise. Extension service is expected to have positive relationship with number of bamboo pole bundles supplied for sale. Expansion of extension education among producers may enhance the commercial engagement of producers and improve the accessibility of bamboo resources for commercial production (Tefera et al., 2013). It is expected that extension services widens the household's knowledge with regard to better bamboo quality supply and positively impact bamboo market supply.

Access to market information (AMI): This is a dummy variable taking value of 1 if the harvester has access to market information and zero otherwise. It is assumed to have positive impact on the supply of bamboo pole bundles. If farmers gain the proper information about what the market needs and what buyers are willing to pay, they are more likely to make wise decisions in forest management and work in a more efficient way (Wang, 2006). Therefore, lack of market information obstacle that prevents farmers from gaining more benefits from forest management.

Market Linkages (MLINK): This is a dummy variable that takes value of 1 if the harvester has linkage/relationship with buyers of bamboo poles and zero otherwise. It is assumed to have positively related to the number of bamboo pole bundles supplied for sale. Setting up a local bamboo marketing center in or around the bamboo growing area or processing area would significantly help to build a strong connection/linkage between the bamboo growers, processing industries and traders (Wang, 2006). Hence, increase market supply of bamboo products.

Number of bamboo pole bundles harvested (NBPBH): It is an independent continuous variable and measured in number of bamboo pole bundles harvested in 2014. The variable is assumed to have positive relationship with the number of bamboo pole bundles supplied for sale. Household who harvest more bamboo products supply more to the market than those who harvest less.

Annual non-bamboo income (ANBIN): This is one of the determinants of lowland bamboo poles market supply. It is a continuous variable and represents the amount of income earned in 2014 E.C from other sources, excluding income generated from bamboo products. It is measured in Birr[2]. It is noted that poorer households are widely involved and gather more NTFP. This variable is expected to influence marketable supply negatively.

Price of bamboo pole (PRICE): This is continuous variable measured in birr per bamboo pole. This variable is expected to influence marketable supply positively. When the price of the product is promising, farmers are motivated to take their produced to the market. Bamboo marketing system and pricing affects household engagement in and benefits from the bamboo development and production system (Mokennen et al., 2014).

Various challenges and opportunities were identified in bamboo marketing and management aspects by workshop discussion held with market actors, then after from the raised challenges were prioritized using pair-wise ranking matrix.

RESULTS

Socio-demographic characteristics of respondents

Respondents are farmer households who harvest bamboo culms from forest either for domestic use or sale. About ¾ of the interviewed respondents were male- and the remaining were female-headed households. About 57.4 and 39% of total interviewed harvesters had an access to extension services and market information about bamboo. Of the total respondents, 90.1% were married, whereas the remaining 9.9% harvesters were single. Concerning educational level, about 42.6% respondents did not attend formal education, whereas 41.8 and 15.6% of the sampled respondents attended primary and secondary education level, respectively (Table 2).

The result of study indicated that maximum and minimum age of sampled respondents was 18 and 66, respectively with average age of 40.25. This implies that majority of the harvesters are in working age. Harvester

[2]The basic unit of money in Ethiopia; equal to 100 cents

Table 3. Socioeconomic characteristics of respondents (continuous variables).

Variable	Observations	Minimum	Maximum	Mean	Std. Deviation
Age [years]	141	18	66	40.25	11.055
Experience [years]	141	3	6	4.53	1.112
Supplied culms [No. of bundles]	141	5	120	41.87	26.971
Family size [No.]	141	2	20	8.37	4.308

Table 4. Relationship between mean of bamboo culm bundles and socioeconomic characteristics.

Variable	Category	Mean culm supplied for sale[in bundles]	Std. Deviation	t-test
Marketing linkage	No	36.33	21.796	-7.905***
	Yes	82.29	27.186	
Sex	Female	32.47	14.91	-1.392
	Male	48.36	26.751	
Access to extension services	No	21.27	7.865	-11.736***
	Yes	57.14	25.944	
Access to market information	No	36.21	21.639	-2.966**
	Yes	50.73	31.906	
Experience	3-4 years	28.96	15.261	-7.089***
	5-6 years	58.32	29.679	

*** and ** indicates statistically significant at 1 and 5% significance level, respectively.

households had an average of 4.52 years of experience in supplying bamboo for sale with minimum and maximum of 3 and 6 years, respectively. On average, 41.87 bamboo culm bundles were supplied annually for sale by sampled households with maximum and minimum of 120 and 5 bundles, respectively (Table 3).

Even though there was no significant difference between the mean values of bamboo culm bundles supplied by male- and female-headed households, the activity were dominated by male-headed households. This is due to the fact that the task is very challenging for females to harvest and transport culms from inaccessible and remote areas to selling place. As indicated in Table 4, the mean value of bamboo culm bundles supplied by harvesters who had access to extension services about bamboo is significantly different from harvesters who had no access to extension services at 1% significance level. As well, the mean of bamboo culm bundles supplied by harvesters who had an access to market information and marketing linkage concerning bamboo are statistically significantly different from those harvesters who had no access to market information and marketing linkage at 5 and 1%, respectively. Harvesters who had 5 years and above experience in raw bamboo selling were supplied more bamboo bundles than those harvesters with less than 5 years of experience. This difference is statistically significant at 1% significance level.

Education level and family size

As shown in Table 5, about 42.6% bamboo harvesters did not attend formal education, but the remaining 41.8 and 15.6% of the bamboo harvesters had primary and secondary education level, respectively (Table 6). The mean of bamboo culms supplied by harvesters who attended secondary education level was 68.91 bundles, nonetheless on average 22.65 bamboo bundles were supplied by harvesters with no formal education. There was a significance difference among the mean of bamboo culm bundles supplied by harvesters with secondary education level, primary education level and with no formal education at 1% significance level. The reason behind this is that educated harvesters

Table 5. Education level, family size of respondents and supplied bamboo culms.

Variable	Category	N	Mean of culms supplied for sale	Std. deviation	F-test
Education level	Not attended formal education	60	29.65	15.69	22.891
	Primary level	59	44.22	24.59	
	Secondary level	22	68.91	35.78	
Family size 15 ≤age≤64	0-2	42	30	22.21	48.07
	3 -5	63	32.22	14.65	
	6-8	22	61.95	26.18	
	9-11	14	89.36	11.37	

Number of observations (N) =141, 15≤age≤64 represents family members in working age.

Table 6. Determinants of number of bamboo culm bundles supplied for sale.

Variable	Coefficients	Std. Error	t-value	p-value
Constant	-16.524	5.375	-3.074	0.003
SEX	1.727	1.872	0.922	0.358
AGE	-0.091*	0.087	-1.045	0.098**
FASI	0.451*	0.218	2.069	0.041**
EDULEV	0.694**	0.223	3.112	0.002***
EXPER	1.575*	0.771	2.042	0.043**
AEXSER	1.852	2.382	0.777	0.438
AMI	4.366**	1.480	2.949	0.004***
M LINK	8.280**	2.293	3.611	0.000***
NBPH	0.628**	0.044	14.210	0.000***
ANBIN	-0.001	0.000	-1.199	0.233
PRICE	5.160**	1.122	4.600	0.000***

N=141; R^2 =93.4; adjusted R^2=92.9; ** and *** indicates significant at 5 and 1% significance level.

understood bamboo selling as income source. This is inducement for harvesters to pay due attention for bamboo resource management. About 44.7% sampled households had 3 to 5 individuals in working age in family members. The remaining 29.8, 15.6 and 9.9% of total respondents had 1-2, 6-8 and 9-11 individuals in working age in family members, respectively. Mean of bamboo culm bundles supplied by these groups showed significant difference at 1% significance level. This is attributed to the fact that households who had more family members in working age provide high number of labor for bamboo harvest; this puts the quantity of bamboo culm bundles to a larger.

Econometric output of the regression model

Before running the OLS regression analysis, all hypothesized variables were checked for existence of heteroscedasticity and multicollinearity. The result of Breusch-Pagan showed that there was no heteroscedasticity problem (p=0.15) at 1% significance level. Variance inflation factor (VIF) and contingency coefficients (CC) were used to test the existence of multicolliniarity problem among continuous explanatory variables and dummy variables, respectively. The results indicated that there was no serious problem among the independent variables.

Age of the household head (AGE)

The age of the household was associated with the quantity bamboo culm bundles supplied for sale negatively and statistically significant at 5% significance level. This implies that older individuals supply less quantity than younger. As age of the household head increases by one year, the amount of bamboo culm

supplied for sale decreases by 0.091 bundles as bamboo resources are located in remote areas and challenging to transport to selling places for aged households.

Family size (FASI)

The result shows that family size has positive relationship with the quantity of bamboo culm bundles supplied for sale at 5% significance level. An increase in family size by one individual in working age increases the quantity of bamboo culm bundles supplied for sale by 0.451, keeping the other variables constant.

Education level (EDUCLEV)

Education has showed direct association with the quantity of bamboo culm bundles supplied for sale at significance level of 1%. On average, if the harvesters get educated, the number of bamboo culm bundles supplied for sale increased by 0.694 bundles. This is due to the fact that education improves ability of the households to earn income from different sources.

Experience (EXPER)

Experience in supplying bamboo for sale is significantly and positively related to the quantity of bamboo culm bundles supplied for sale at 5% significance level. One year increase in experience of bamboo culm supplying and selling increases the number of bamboo culm supplied for sale by 1.575 bundles.

Access to market information (AMI)

This variable is positively related to quantity of bamboo culm supplied for sale at 1% significance level. Households who had access to market information supplied 4.366 more bamboo culm bundles than those who had no market information. Access to market information helps to acquire new idea and information related to bamboo market and increases bamboo culms supplied for sale.

Marketing linkages (MLINK)

The variable is positively related to the quantity of bamboo culm supplied for sale and statistically significant at 1%. Harvesters who have a relationship with bamboo buyers supplied 8.280 bundles than those who do not have marketing linkage.

Number of bamboo culm bundles harvested (NBPBH)

The variable is positively related to number of bamboo culm supplied for sale at 1%. This show as number of harvested bamboo increases by one bundle, the number bundles supplied for sell increases by 0.628 bundles, that means if harvested culms exceeds the domestic demand for consumption, extra bamboo culm (surplus) would be supplied for sale to meet the income demand households.

Price of bamboo culm (PRICE)

Price of bamboo is positively related to the number of bamboo culms supplied for sale and statistically significant at 1% significance level. In this case as the price of bamboo culm increases by one unit, the amount of honey supplied to the market will increase by 5.160, other things remain constant.

Bamboo management systems and marketing

Farmers frequently cut immature/young culm growing at peripheral of clumps, as the harvesting is easy and quick. In addition to this, culms harvested in rainy season at the clump have high starch content for new growing shoots[3]. This practice ultimately destroys the clumps by gradually decreasing the rhizome vitality (Figure 3). Consequently, deteriorate the resource and adversely affect the regenerative capacity of the clumps as well as future bamboo availability. Culm harvesting should be only during the dry season. The starch content of bamboo is lower during the periods of dryness. Lower starch content in the culms will make them less susceptible to attack by borers. Unharvested aged culms at the center of clump die and start rotting in the rainy season. This attracts insects and fungi initiating diseases in the clumps and leads to fall in clump health and decreases the volume of bamboo culms for local users. Agricultural office of the district manages bamboo resources to a little extent. As per bamboo utilization regulation devised by regional government individuals who harvest dozens of culms shall get permission from agricultural office of the district. Once permission is provided, the office does not control the rafts whether the exactly requested amount or not. It is informally known that harvesters take out more bamboo culms than the exactly formally requested; this negatively impact sustainability of bamboo resource in the Homosha district.

Farmers harvest culms for sale and/or home use. There were a very limited local market and demand for

[3]Bamboo shoots are the new culms that just emerge from existing clump.

Figure 3. Peripheral young bamboo culms harvested due to quick and easy access.

raw bamboo culms and manually manufactured bamboo products. The marketing activities of rudimentary products in the study area were confined to the area and were not broadcasted in the region. The bamboo marketing system is not further developed or organized in a systematic way to create and improve market linkage between suppliers and consumers in the study area. Even though the bamboo handicrafts supplied to a lesser extent, consumers were not willing to buy these products due to poor quality and design, hence low demand and price for bamboo manufactured products in the study area. Regarding bamboo culms, more the culms are supplied to the market, so that the price per culm was low. As well bamboo forest a free access and community harvest bamboo with no payment from the forest and reluctant to purchase culms. This resulted in less market demand for bamboo culm.

Prospects and challenges in bamboo marketing in the study area

Homosha has high natural bamboo resources. The main road from Ethiopia to South Sudan passes through this district. This creates an opportunity to export both raw bamboo and processed bamboo products to South Sudan. Bamboo Star Agro forestry Plc. was installed in the Asosa town, about 36 km from Homosha district. The factory started bamboo processing at small scale; in future if the factory started bamboo processing on the large scale, the harvesters might supply bamboo culms for the factory and will be benefited. This is a great opening for bamboo marketing, since it creates demand for bamboo culm as well as produces considerably designed and quality products. Thus, supply of good quality and durable bamboo products that changes attitudes of the people for poor quality and low durability bamboo products. This expands market for bamboo products. Non-governmental organization (NGO), Natural Resource Development and Environmental Protection (NRDEP) started bamboo seedlings production to rehabilitate depleted bamboo resources by South Sudan refugees who settled in the study area. This is great opportunity for sustainability of bamboo resource and whenever the activity continued and expanded, future market supply will be sustained.

The uses of bamboos are restricted to the household level, and the primary use of raw bamboo material is for housing, fencing and household utensils in Homosha district. Thus, bamboo marketing confined to local area. There is no strong linkage among bamboo marketing actors. The stakeholder consultation workshop discussion on bamboo value chain at held at Hawassa University, Wondo Genet College of Forestry and Natural Resources on March 23-25, 2015 also identified poor marketing system in Benishangul Gumuz Regional State and Sidama zone of South Nations and Nationalities and Peoples region.

There is lack of training for market actors and lack of research on bamboo production, processing, management and utilization in the study area. Natural stands are declining due to human related activities and gregarious flowering and currently, nearby bamboo resources are exhausted. Anthropogenic (poor management) and natural (gregarious flowering) causes diminish the future bamboo availability to meet demand of users. Refugees from Southern Sudan living in Homosha district are exerting pressure on bamboo resources. Even though refugees are disallowed to sell bamboo culms to the market, high numbers of bamboo culms were harvested for home use. Renewable resources are exhaustible if harvested for too long at a rate exceeding their regeneration capacities. The identified challenges in the lowland bamboo marketing were prioritized using pair-wise ranking matrix as follows:

(1) Lack of marketing chains/linkages,
(2) Low market demand for bamboo products,
(3) Lack of infrastructure (road s and transporting facility),
(4) Lack of market information accessibility concerning bamboo marketing,

(5) Lack of market center for bamboo products,
(6) Lack of government support for bamboo product market expansion,
(7) Lack of training and working tools for craftspersons,
(8) Lack awareness (about bamboo economic value the resource).

DISCUSSION

Determinants of bamboo culm market supply

Aged household could not go far to harvest bamboo culm and they are not capable to extract bamboo culms from inaccessible areas. Adult members significantly influence the decision to participate in non-timber forest products extraction and marketing (Prakash et al., 2006). According to these authors, the probability of households participating in forest product commercialization was negatively correlated with age of household heads participating in non-timber forest products activities. As household head is becoming aged, the amount of bamboo culm supplied for sale is declining. As the number of family members with working age increases, bamboo supplied to the market will rises. The study of Arun (2006) shows that family size is positively related and has significant effect on non-timber forest products extraction and market supply. In the study area, mostly students harvest and sell bamboo culms during their free time to cover educational expenses. Household heads who attended formal education supplied more bamboo culms to the market. This is similar with Marshall et al. (2006), who found that in the case of soyate palm (non-timber forest products), the more educated the producers, the larger the share of their income contributed by non-timber forest products commercialization and education improves awareness to market and help the actors to acquire new idea in relation to market information and thereby increase bamboo culms supplied for sale.

Household engaged in bamboo marketing for longer time supplied more culms than new harvesters recently started bamboo marketing. Marketing skills and experiences are essential for buyer and sellers of non-timber forest products and experience is an important asset for traders who remained surprisingly faithful to particular products (Marshall et al., 2006). The study of Alejandro (2005) shows that a family experience of participation in gathering and harvesting has a positive impact on participation in non-timber forest products harvest. Access to market information facilitates bamboo marketing activities, hence, increases bamboo market supply. According to IFAD (2008) without access to market information, forest dwellers have little knowledge of how much a consumer in the city or in developed countries will pay for the final product, and they have little or no means of bargaining for an increased stake in growing profits. Similarly, harvesters who have better access to market information, have the probability of getting better price, which would in turn increase the market supply. Non-timber forest products markets are usually characterized by asymmetric information (Simone and Erin, 2007). Interactions market actors seen as a source of knowledge and learning for innovation (Flint et al., 2008; Morrison et al., 2008; Bakhshi and McVittie, 2009; Fu et al., 2011). Besides market information, marketing linkages also plays positive role in bamboo marketing. According to Marshall et al. (2006), good organization and linkage of non-timber forest product producers and processors contributes to improved product quality and quantity, more cost-effective transportation and increased negotiating ability. Development of infrastructure for linking resource, consumer centers and expansion of extension education among producers may enhance the commercial engagement of producers and improve the accessibility of bamboo resources for commercial production (Tefera et al., 2013). The same study indicated that in most bamboo growing areas of Ethiopia market linkages are weak with a small number of intermediaries and trade is largely restricted to local markets.

In Ethiopia, there only exists a very limited local market for bamboo handicrafts which are not further developed or organized (Wang, 2006). Particularly, in the study area, there only exists a very limited demand for bamboo culms and bamboo related products and its marketing system which is not developed and organized. Raw bamboos were processed locally by using rudimentary tools and traditional techniques, hence, limits the raw bamboo culm markets. The types and number of bamboo products produced by craftspersons in the study area were very few. These products have low local market demand. Asian experiences (Pabuayon, 2009) indicate that new products and designs, appropriate materials and processing designs increase return and durability of bamboo products which leads to expansion bamboo marketing system. Ethiopia does not have a modern bamboo based processing industry, and the handicraft sector is poorly developed and affects the marketing activity (Wang, 2006). In Africa, some progresses have been registered for manufactured products (Bell, 2007; Juma, 2011). Nowadays, in Ethiopia also few bamboo processing factories are installed in Ethiopia. Lowland bamboo is declining at an alarming rate as a result of forest clearing to establish new agricultural land, forest fires, for human resettlement programs, unregulated harvest and flowering.

Bamboo management systems and marketing

Little is known about the harvesting and utilization of

bamboo in Africa, specifically in Ethiopia. Lack of modern management scheme or extremely traditional management system (UNIDO, 2006) and lack of research and development (R&D) and extension packages (Adnew and Statz, 2007) caused deterioration in productivity of bamboo stands in Ethiopia. Additionally, Berta Ethnic group, the dominant ethnic group in the district, uses bamboo shoot for food in growing seasons. As a result, overharvest of bamboo shoot shrinks availability of bamboo stand in the Homosha district. Presently bamboo resources are available in remote and inaccessible areas where the human and encroachments are less. In Ethiopia, bamboo stands are either depleted because of overharvesting of young culms or poor management (Motuma and Yigardu, 2015). Government owned bamboo forests are actually nobody's forests that have been suffering from the "tragedy of the commons" (UNIDO, 2006). No protection what so ever from illegal harvesting, wildfire, pests and disease; no protection from encroachment and clear felling; no practical arrangements exist to manage, protect and utilize the especially in lowland bamboo forests (Motuma and Yigardu, 2015). The government of the Ethiopia lacked economic incentives to value and prioritize bamboo resource as useful commodities that require attention and planned action, as a result did not budget adequate finance to protect, manage and use them the resource properly (UNIDO, 2006). The uncontrolled exploitation of this resource has resulted in reduced productivity and yields as well as resource deterioration in different areas the country including the study district. Bamboo promotion to various bodies increases. However, if bamboo is promoted and demand and cultivation and sustainable, long-term supply and management harvesting and management need to occur in parallel (Verina and Julius, 2012).

In the study area, resource wastage during harvesting, transporting and processing were observed. Bamboos were cut at above 1 m from the ground and chopped off the upper narrow part to take out only the middle portion. According to Fayera et al. (2016) lack of efficient culm utilization and only about 1/3 (middle part) of the whole bamboo culm were used, whereas the remaining 2/3 of the whole culm were discarded. Unprocessed bamboo culms are dominantly traded due the lack of skilled processors and capital. Most developing countries, especially those in Africa, are still trading primarily unprocessed products and are locked in low-skill activities (World Bank, 2006; Juma, 2011; Bell, 2007). Bamboo marketing in Africa is circumscribed to bamboo growing sites and consequently, bamboo is less commercialized compared with other regions or products, for instance 93% for bamboo from Guanxi, China (Hogarth and Belcher, 2013) is commercialized. In Ethiopia, bamboo processing is manual and produces less durable products (Tefera and Pretzsch, 2012). Similarly, markets for bamboo are not well developed (Andargachew, 2008; Tefera et al., 2013; Mekonnen et al., 2014). This situation contributed to low local market demand for raw bamboo culms in the country. Harvester households had long experience in bamboo harvesting for domestic utilization (Fayera et al., 2016). Nevertheless, they had short experience (3-6 years) in supplying bamboo for sale. This determined the market extent of bamboo market of the region. Most of the harvesters involved in the bamboo culm marketing were got formal education. Educated household heads tend to diversify income and, hence, participate more in cash-generating activities, such as bamboo production and marketing (Mekonnen et al., 2014).

Presently, there is shortage of forest products specifically with an expected increase of demand for lumber and wood-based products in the future (Gebremariam et al., 2009). Since the past few years, such a gap has triggered bamboo utilization and is becoming the major substitute of wood for house construction in Ethiopia (Alito, 2005; Bewketu, 2009; Gebremariam et al., 2009; INBAR, 2010; Kibwage and Misreave, 2011). This facilitated bamboo marketing activities in different parts of the country. Additionally, domesticated production system is often preferred to afford a sustainable and adequate source of raw material with desired quality (Tefera et al., 2013). Successful commercialization of tree products depends on the domestication of product sources and the production activity (Schreckenberg et al., 2006). In Ethiopian where bamboo is originating from domesticated systems such as in Sidama and Awi is more commercialized than the resources obtained open-access bamboo forests of Sheka and Benishangul Gumuz region. Bamboo is harvested from natural forest in Benishangul Gumuz region (Fayera et al., 2016). In Sheka and Benishangul Gumuz region bamboo market was intermittent and prices are low enough and producers are discouraged from investing in management and trade. However, in Sidama and Awi zones, it is harvested from privately possessed land (Tefera et al., 2013) and producers earn high income due to sufficient buyers as compared to farmers in Homosha district. This shows that producers engage in private cultivation whenever there is an economic advantage relative to wild harvesting. Domestication of wild species mostly linked to the economic importance obtained from it (Schippmann et al., 2006). Recently, there are some progresses in bamboo marketing in Ethiopia including the study area.

Conclusion

The study was conducted to analyze determinants of

bamboo culm market supply and to look into its management aspects. Farmers in the study area harvest bamboo domestic use and also sell bamboo culms in order to meet their income demand. Raw bamboo is a primary bamboo product traded in the local market of study area. Quantity of bamboo bundles supplied for sale is function of socio-demographic factors. Lack of raw bamboo processing center and knowledge diminished local market demand of raw bamboo culms. Bamboo has got less attention and its management is very loose, because of the sustainability of the resource is doubtable unless intervened. The results showed that education level, access to market information, marketing linkage, family size, bamboo culm selling experience harvested and price of bamboo culms were significantly and positively related to quantity of bamboo culms supplied for sale, while the age was significantly and negatively related to number of bamboo culms extracted and supplied for sale. Households with more experiences in bamboo culm selling with good interaction (marketing linkage) supplied larger number of bamboo culm bundles. There is significantly positive relationship between price and quantity of supplied culm. Therefore, improvements in market information regarding bamboo, price and marketing interaction among harvesters and buyers increases the number of bamboo culms supplied for sale, hence, boost income for harvesters which is incentive to engage in resource management. Homosha district has huge coverage of natural lowland bamboo standing; however, the resource is worsening due to natural and human related activities. The main road from Ethiopia to South Sudan passes through Homosha district, created a chance to export bamboo products. Bamboo processing factory installed in Asosa town, this pave a way for harvester to supply bamboo culms to the factory. Contrary to these opportunities, there were challenges in bamboo marketing such as lack of skill oriented training for market actors and lack of research on bamboo production, processing and utilization.

RECOMMENDATIONS

Marketing linkages and access to market information are critical determinants and significantly and positively related to the supply of bamboo culms positively. Therefore, strengthening relationship between buyers and harvesters, and disseminating relevant information help to improve supply of bamboo for sale.

Education level of households and price of bamboo culms are positively and significantly related to the number of bamboo culms supplied for sale. In order motivate for the management and supply of culms for market, it is better to aware community about economic value of this resource and to discover new buyers.

More experienced households in selling bamboo are supplied larger number of bamboo bundles than households with fewer experiences therefore, increasing awareness and providing training for younger households (older harvester supplied less as compared younger) concerning bamboo supply for sale will encourage them supply bamboo culm.

Family size with high number of members within working age supplied more bamboo culms for sale. Therefore, it is well again if these individuals get training concerning on bamboo management and marketing.

It is better to install small basic bamboo processing centers; this may boost the culm demand locally.

Bamboo resources must be advocated for its economic benefits and ecological stability.

Further research needs to be conducted on bamboo and shoot production, processing, management and utilization.

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CONFLICT OF INTEREST

The authors have not declared any conflict of interest.

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