ASSESSING THE CONTRIBUTION OF BAMBOO PRODUCTS ON THE SMALLHOLDER FARMERS INCOME GENERATION: A CASE OF ASSOSA WOREDA, BENISHANGUL GUMUZ REGIONAL STATE, ETHIOPIA

By

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PROJECT WORK SUBMITTED FOR PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ART IN 'RURAL DEVELOPMENT

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I. Declaration

I hereby declare that dissertation entitled Assessing the Contribution of Bamboo Products on the Smallholder Farmer Income Generation: The Case of Assosa Woreda, Benishangul Gunuz Regional State, Ethiopia submitted by me for the partial fulfillment of the MA in Rural Development to Indra Ghandi National Open University (IGNOU) is my own original work and has not been submitted earlier either to IGNOU or to any other institution for the fulfillment of the requirement for any course of study. I also declare that no chapter of this manuscript in whole or in part is lifted and incorporated in this report from any earlier work done by me or other.

Place ---Addis Ababa, Ethiopia--- Name ---Enatnesh Assfaw---

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Certification

This is to certify that MRS Enatnesh Asfaw Zenebe student of MA(RD) from Indra Gandhi National Open University, School of Continuing Education was working under my supervision and guidance for her project work for the course M.A. Degree In" Rural Development" her project entitled Assessing the Contribution of Bamboo Products on the Smallholder Farmer Income Generation: The Case of Assosa Woreda, Benishangul Gumuz Regional State, Ethiopia," which submitting is her genuine and original work

Place Ethiopia
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Date 11/20/2019

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II. Acknowledgement

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III. Dedication

I dedicate this Thesis for two beloved people who meant and continue to mean so much to me. Although they are no longer of this world, their memories continue to regulate my life. First and foremost, to my Mother Enanu Mihrete Getu whose love for me knew no bounds and, who taught me the value of hard work. Thank you so much “Enate”, I will never forget you.

Last but not least I am dedicating this to my Grand Mother Buzualem Tefera gone forever away from our loving eyes and who left a void never to be filled in our lives. I love you both and miss you beyond words. May their Soul Rest in Peace!

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VI. Acronyms

BGRS	Benishangul Gumuz Regional State.
BoFED	Bureau of Finance and Economic Development
CIDA	Canadian International Development Agency
CSA	Central Statistical Authority
DA	Development Agent
FAO	Food and Agriculture Organization
HH	House Hold
FHH	Female Headed Household
IFAD	International Fund for Agricultural Development
INBAR	International Network for Bamboo and Rattan
MHH	Male Headed Household
SPSS	Statistical Packages for Social Sciences
UN	United Nations
UNDP	United Nations Development Program
UNESC	United Nations' Economic and Social Council
WARDO	Woreda Agriculture and Rural Development Office

VII. Abstract

Oxythenathera Abyssinica Known as low Land Bamboo is a perennial, multipurpose and a fast growing plant that supports local livelihoods in many ways. However, for long its uses have been limited to traditional applications. Although bamboo has quit high distribution and widely utilized by large number of local communities in Ethiopia, little baseline information on its livelihood support and domestic status exist for several areas. The purpose of this study was to study or to know the current level of bamboo and bamboo product contribution on the life of rural household in Assosa woreda Benishangul gumuz region. The interest to begin this research was to ensure that this baseline information was available for documentation of local use and economic benefit from bamboo trade is necessary to understand the opportunities and constraints to bamboo harvesting, and how economically vulnerable these households. The major sources of data for the study were 154 Female and Male house hold head of Abrhamo and Abendem Engda kebele community member. The researcher used descriptive research method to present facts. In addition, both primary and secondary data were collected from various sources using different techniques. The collected data were analyzed using both qualitative and quantitative methods. To this end, questionnaire and interview methods of data collection were employed. Thus, the collected data were tabulated, presented and analyzed by using SPSS descriptive and inferential analysis were used to interpret the data.

The study identified that Bamboo was one of the major income source on the life of representative household on the target kebeles especially because the access they have the nearby bamboo forest and the subsistence crop production and agriculture production/and also the contribution of the bamboo products for the household life were differentiate from household to household through their age composition and the available productive household member within household and related key matters etc. *To add, the sustainability of bamboo products in Assosa woreda were affected with many challenges .These were; the*

extreme exploitation, wild fire, lack of sufficient training about bamboo plantation technique of the sustainable utilization of bamboo harvesting technique which include storage and handling , lack of proper market linkage which lead them to sell their bamboo with low-priced which attributed to the middle man role instead of the primary household and inadequate support from stakeholders

Furthermore, based on the major findings and conclusions, recommendations were made as it needs training, support on different modern technologies, support from NGOs and Government for the household and strong institutional linkage with concerned bodies to provide bamboo products for local consumption and for export market purpose. .

Keyword: Oxynanthera Abyssinica, livelihood, Ethiopia, Assosa, rural households, lowland bamboo

CHAPTER ONE

1. INTRODUCTION

1.1. Background of the study

Bamboo is one of the most important non-timber forest products (NTFPs)(Kassahun,2003). It is a grass of great diversity and utility more closely related to trees in its use and appearance. Bamboo is a multipurpose plant of high economic and environmental value that converts solar radiation into useful goods and services better than most tree species (Kassahun, 2003). Bamboo belongs to the grass family, to the genus bambusa that consists over 1200 species (Bystriakova and Kapos, 2006). In which about 43 species are found in Africa. The species are found mainly in tropical and sub-tropical regions. Bamboo habitat distribution overlaps with many economically impoverished developing nations (Kigomo, 1988). Bamboo occupies about 1% of global forest land or approximately 40 million hectares (FAO 2005).). Asia has the most bamboo coverage with 25 million hectares, an area that continues to increase due to ongoing cultivation efforts. In Latin America, bamboo occupies 11 million hectares. Africa holds 3 million hectares of bamboo (Midmore 2009) with over 1 million hectares in Ethiopia (Embaye et al. 2005). Ethiopia's bamboo resources contribute 67% of the total bamboo in Africa (Xuhe, 2003). It is widely recognized plant of great cultural and practical importance globally. The utilization of bamboo has a very long history in the world, particularly in Asian countries but also in Africa and Latin America (INBAR, 2004).

According to The International Network of Bamboo and Rattan (INBAR) estimation over 2.2 billion people benefit from bamboo through income generation and non-market domestic uses including food and housing (Xuhe 2003). Estimates of world trade in bamboo approaches $7 billion annually and according to Zhaohua (2001), over 1500 distinct uses of bamboo have been recorded around the world. For example, bamboo floorboards, fabricated panels, handicrafts, curtains, modern ceilings, bio-energy, charcoal, paper,

clothes, medicine, edible bamboo shoots, bamboo beer, bamboo soft drinks, etc. are important bamboo products in China (Bay 2004, Zhaohua 2001).

Despite the wide distribution and prominent role in many cultures, there are still large gaps in knowledge about the extent, variety, and quality of bamboo species around the world (Widenoja, 2007). Estimates regarding future use of bamboo indicate that there will be a huge shortage for bamboo planting material in medium and long term (BTN, 2002). The amount of bamboo resources available to communities is shrinking in many cases due to problems related to management and optimal use (Bystriakova, et al, 2003). Concerted efforts are needed to generate and adopt the required knowledge and technology in order to promote bamboo forest as an economically viable crop, which is of environmental interest as well and accelerate development and poverty reduction efforts.

Ethiopia possesses about over one million hectare bamboo resources. The two indigenous species of bamboo in Ethiopia are the highland (*Yushania alpine)* and the lowland bamboo(*Oxytenanthera Abyssinica),* (; Bekele Azene , 2000 Luso, 1997). The coverage of lowland bamboo in Ethiopia was estimated to be 700,000 ha, of which about 481 000 ha were mapped (Luso, 1997). Benishangul Gumuz Regional State (BGRS) alone possesses huge lowland bamboo coverage; the region has more than 400,000 ha of naturally growing bamboo; and 77,947 ha found in Assossa woreda (Luso, 1997. The lowland bamboo and its products are among the most important non-timber forest products (NTFPs1) from the socio cultural and economic point of view. Even though the bamboo resource is vast, the potentialities of *Oxythenathera- Abyssinica* in the area for development have never been fully recognized (Kassahun, 2003). The resource is under severe pressure from various sources resulting in higher degradation and threatens it.

At present, these resources are being overexploited (Ensermu et al., 2000; Kassahun, 2003) (Grazing and fire are the most detrimental factors for the natural regeneration and survival of the seedlings. The area coverage of *Oxythenathera-Abyssinica* the area is constantly shrinking owing to the impact of factors such as the expansion of agricultural land,

overexploitation by local communities, forest fire and infrastructure development. According to Kassahun, (2000), bamboo forests were located in the more inaccessible areas, which protected them from destruction but now bamboos are decreasing rapidly as new roads gives opportunity for men to cut and use

It is becoming increasingly apparent that attempts to protect remaining bamboo forests from degradation are not enough. More and more exotic tree species are being introduced, while indigenous bamboo which could grow even faster and could serve similar purposes is being destroyed. However, this resource is not only totally neglected by its potential beneficiaries in the area, but is also being decimated for agricultural land expansion (kassahun, 2004) under burgeoning population pressure. Environmentally responsible development requires that appropriate mitigation measures be instigated to offset potential adverse consequences of current management systems and promote more sustainable forms. To save lowland bamboo forests destruction must not merely be halted, but actually reversed, (Kassahun, 2003). Developing countries like Ethiopia that are aspiring for better welfare and faster rate of development, therefore, need to preserve their remnant bamboo forests and expand their resource base.

Despite some start of bamboo projects by the Ministry of Agriculture and Rural Development since very recently, the bamboo resource of the country is not officially encouraged, (Yigardu and Kindu, 2007). Still, bamboo forests are not considered in the extension packages to date nationally. Consequently, it has got scanty acceptance by both potential investors and growers (FAO and INBAR, 2005). Currently, protection and development endeavors afforded to this species are almost negligible; particularly in the area under consideration.

Decline in both the quantity and quality of bamboo resource and related benefits will continue to further exacerbate the socio-economic and livelihood difficulties of the rural poor in particular, if no appropriate intervention measures are taken. Sustainable conservation and utilization of the remaining bamboo vegetation resources and

rehabilitation of those that have already been degraded is vital for obtaining economic, social and ecological benefits.

Urgent and effective action is required to secure their future existence and for their use on a sustainable basis. Designing appropriate strategies generated by relevant research are vital for bamboo development for society. Generally, despite its overall ecological and economic values of this resource, available information regarding its actual socio-economic role and contributions to the local livelihoods is not yet been fully explored & organized. Like the other forest resource its contribution is often underestimated or overlooked in most economic or poverty surveys and development policies should give attention to its contribution for the livelihood of the rural community (Asfaw, 2008). In this context socio-economic research that infers to its contribution in the local livelihood can serve as a base for stimulating decision by higher officials, for designing practical management and rural development programs. However, knowledge to support such planning is limited.

Previous study in this area focuses in estimation of overall bamboo resource base, and germination (Demelash, 2006) and natural regeneration issues (Kassahun, 2003). A socioeconomic analysis of the bamboo sector in Ethiopia, conducted by Ensermu et al (2000), also more inclined to the production-to-consumption system, though found important. Although it is obvious that all rural households use bamboo extensively, not enough is known about their quantitative contribution to their livelihoods. On the other hand, there is neither research nor detailed information with regard to its contribution for the local communities' livelihood to assist decision makers. Still, the dependence of the surrounding people on these bamboo vegetations was not adequately understood by the regional state officials who make important decision regarding it. Sound socio-economic, environmental and poverty reduction interventions related to forestry should be based on reliable information about the type of resources, location, management status, and its the overall socio-economic as well as environmental importance and values from local to global levels for efficient use of (forest) resources.

As bamboo areas are invariably one of the natural resources in the country's economy. Quantifying its contribution for the communities' livelihood to assist decision and suggesting possible solution is vital for its sustainable development. Therefore, provision of this information is the key to making decisions about resource allocation, and to setting priorities.

The focus of this research was to know the current level of bamboo and bamboo product contribution on the life of rural household in Assosa woreda Benishangul Gumuz region. The purpose of this research was to establish baseline information, and to investigate the economic benefit of bamboo and bamboo product as well to identify the opportunities and constraints of bamboo harvesting in relation with the contribution of bamboo on the income of the female and male household in the target area.

Therefore, in this work, the researcher strived to identify the attitude of the female and male households on bamboo production and products in the target area, the level of bamboo production, the access level of Bamboo, income generation capacity of Bamboo for the life of rural household, the support level of stake holders on the advancement of bamboo production for the improvement of bamboo contribution for the income of rural households as well improve the utilization of bamboo production and products in target area relatively with other income source of the rural household including timber and non-timber forest products in target area/Abendemengda and Abrhamo kebeles in Assosa woreda in Benishangul gumuz region.

1.2. Statement of the Problems

Bamboo has been traditionally perceived in Ethiopia as a plant negligible value in comparison to other forest products. However, many studies indicated that bamboo is a beautiful resistant, flexible, renewable and versatile material. African Humanitarian Action (AHA) (2010) mentioned that it is the wood of the future as it is the fastest growing grass with domestic, agricultural, environmental and industrial uses. Thus, it is an economic resource which having enormous potential for improving the quality of life rural and urban communities with environment regeneration qualities like carbon sequestering and provides raw material for large industries like paper and pulp as well as for cottage and handicraft industry. In relation to this, Conisbee. And. Simms (2003) stated that bamboo is fast growing multipurpose woody grass which has enormous potential for enhancing the environment, reducing poverty and generating sustainable economic growth through investment, industry and trade. Thus, the global market for bamboo product is approximate USD 7 billon which is expected to triple by the end of 2017 Fox, (2007).

With regard to the study area low land bamboo (Oxythenathera Abyssinica) is a major species, rather dominant vegetation formation in the forest. Bamboo resource contribution and utilization is not advanced and limited as compared to the coverage's of bamboo resource in target area (Assosa woreda) which contribute underutilization of bamboo resource. Despite the fact that forestry research has been conducted in the country for the last 30 years, bamboo is still not considered as a research commodity: hence, there are no particular personnel and facilities assigned for it. Rather it was treated together with other forest tree species (Kinde Mengistie Mulatu Yigardu 2010).

More recently training centers on bamboo processing have been started in Assosa town. This action was collaborative effort of the Ministry of Agriculture and Rural development(MoARD) and Ministry of Trade and Industry(MoTI) of Ethiopia. It was at the beginning of Ethiopian Millennium (2007 and 2008) that bamboo was declared to be "the Millennium grass".

Currently, one of the most challenging issues of this resource is overexploitation. Grazing and fire are also most detrimental factors for the natural regeneration and survival of the seedlings. These situations impose critical challenge and leads to shrinking of the coverage of the bamboo. This is also aggravate by the impact of expansion of agricultural land, overexploitation by local communities, forest fire and infrastructure development.

The other problem associated to this resource is decline in both the quantity and quality of bamboo resource and related benefits. This situation is also expected to aggravate the socio-economic and livelihood difficulties of the rural poor in particular. Appropriate measures are not taken to alter this situation. In relation to this project on bamboo with responsible bodies is not sufficient. Bamboo forests are not considered in the extension packages to date nationally. Protection and development efforts this species are almost insignificant; particularly in the area under consideration.

The other issue is efforts to sustainable conservation and utilization of the remaining bamboo vegetation resources and rehabilitation of those that have already been degraded is critical area to achieve the require and expected benefit.

Even though, ecological and economic values of this resource is very significant, information available in relation to bamboo is and actual socio-economic role and contributions to the local livelihoods of the community is not sufficiently been fully explored & organized.

So, policies that bring such efforts into effect are important (Ibid). Thus this study will investigate the extent of bamboo utilization as a means of income generation supporting the rural poor so as to display implications to take sounding action.

2. OBJECTIVE OF THE STUDY

2.1. General objective

The general objective of the study is to investigate the role and importance of bamboo products for the small holder farmer income generation in the study area, Assosa woreda.

2.2. Specific Objectives

1) To quantify the contribution of bamboo to household incomes in target village;
2) To identify differences in household bamboo harvesting rates
3) To assess entry barriers or assets required by households to produce bamboo products ; and
4) To evaluate opportunities and constraints to sustainable bamboo production and products in Assosa woreda,

3. Research Questions

1) What amount is the Bamboo production contribution to the smallholder's income generation in Assosa Woreda?
2) In what rate is bamboo harvesting in Assosa Woreda?
3) What are the obstacles for bamboo production in Assossa woreda?
4) What opportunities are available to bamboo production and income generation in Assosa woreda?

4. Important terms used in the project content

Bamboo: - Bamboo is a multipurpose plant with a myriad of applications ranging from construction materials, furniture, fences, handicrafts, pulp and paper, edible shoots, and animal fodder.

Low land bamboo: The lowland bamboo species is botanically known as Oxythenathera Abyssinica. It is a clump forming, solid stemmed bamboo that is widely distributed in the dry regions in the western part of Ethiopia.

Highland bamboo: The highland bamboo species is botanically known as Yushania alpina. This species grows naturally in ecological zones of the country between 2200 –3500 meters above sea level.

Bamboo products: - Materials which made from bamboo culms or different parts of bamboo plant

Small holder farmers: is based difference within the large population of households engaged in agricultural production on relatively small scale.

Contribution: Contribution refers to the act of contributing or the thing contributed (such as personal time, money, private property which contributed to lead the life small holder farmers)

Income: Income is the sum of all the wages, salaries, profits, interests payments, rents, and other forms of earnings received... in a given period of time.

Kebele: government/public administrative organ/body at a grass root level in Ethiopia

Woreda: government administrative organ/body subordinate to Zonal administration in Ethiopia

CHAPTER TWO

2. LITRETURE REVIEW

2.1. Non-Timber Forest Products and their Contribution to Livelihood Security

Non-timber forest products (NTFPs) are crucial for meeting the food, housing and income needs of millions of household throughout the world (Ambrose-Oji 2003, Vedeld and Sjaastad 2014). Population growth and unsustainable forest management have resulted in deforestation and reduced availability of NTFPs in many regions (Dessie and Kleman 2007). Millions of people, particularly in developing nations, rely upon NTFPs each day for "food, fuel, health, and income security" (INBAR 2014). Of all NTFPs, bamboo and rattan are considered to the most important and widely used (INBAR 2014).

The underlying role and importance of NTFPs to rural households were synthesized by Belcher et al. (2005) in a comparative analysis of the literature. They found that: 1) NTFPs are widely accessible and crucial to the rural poor, 2) harvesting NTFPs is less ecologically harmful than timber harvesting, and 3) as NTFPs become more valuable, local harvester are incentivized to conserve resources to sustain the supply and future income earnings.

NTFPs directly and indirectly contribute to livelihood security by providing a variety of consumable or profitable resources (Arnold and Townson 1998, Babulo et al. 2009). Many on-farm livelihoods, such as crop cultivation or cattle rearing, require sizeable inputs such as money or land; households without these fundamental inputs cannot easily participate in such livelihoods. Instead, they rely on wild NTFP harvesting to provide crucial domestic/nonmarket and cash income resources. Harvesting NTFPs poses relatively few entry barriers and are often an important contribution to households that have limited income earning opportunities or few assets. NTFP harvesting often complements a multitude of other livelihood activities to ensure household needs are met year round (Babulo et al. 2009, Tesfaye et al. 2011). Without access to NTFPs, it has been estimated that over a billion people in developing countries would be unable to survive (INBAR 2014). Therefore, sustaining forests and the NTFPs they support is crucial for social resilience (Belcher et al. 2005, Nygren et al. 2006).

Extensive research has documented the significance of NTFP harvesting among rural households, particularly in developing nations. These studies show that harvesting NTFPs is an essential livelihood activity for many rural Africans (Babulo et al. 2009, Cavendish and Campbell 2008, Nygren et al. 2006). Forest products are utilized both in the home or sold and traded as needed (Awadh 2010, Belcher et al. 2005). It has been argued that NTFP harvesting results in less ecological damage than timber extraction (Belcher et al. 2005) because many NTFPs regenerate quickly and/or reproduce vegetatively, and occur in the understory where their removal does not alter forest cover, structure or fundamental biophysical conditions and processes (e.g., nutrient cycling). Bamboo has great potential to be managed and harvested sustainably for benefit by rural households, much like rattan in SE Asia, as documented by Siebert (1995).

NTFPs are often managed as communal resources and are available to individuals as desired or needed. Babulo et al. (2009) states that forest resources help rural households meet their subsistence needs, provide a security net, and potentially alleviate poverty through increased and sustained household income. Many rural African communities rely on local NTFPs, but their contribution to individual households ranges widely (Arnold and Townson 1998, Shackleton and Shackleton 2004, Tesfaye et al. 2011). Cavendish (2000) studied the intensity and variation of forest product use among rural households in Zimbabwe and found that NTFPs are not relied upon and do not profit all households equally. Some research has documented that cash income from NTFP harvesting can reduce the income gap between the poorest and better-off households in a community (Cavendish and Campbell 2008). These results are found when forest products are harvested by poorer households, but not as much by wealthier households as they have alternative livelihood strategies not accessed by the poor (i.e. formal employment, cash crop farming, migrant remittances) (Babulo et al. 2009). Also commonly noted in NTFP research is that wealthier households appear to harvest greater quantities of NTFPs, even though they are less dependent on that income for survival than poorer households (Cavendish and Campbell 2008, Godoy et al. 1995). Understanding household extraction rates is imperative to ensure management of common property resources (Ambrose-Oji 2003). Additionally, identifying

what influences individual and household interest in and capacity to harvest NTFPs helps bridge income gap disparities (Cavendish and Campbell 2008), increase livelihood security and income generation for rural households (Belcher et al. 2005), and facilitate sustainable resource management.

2.2. Bamboo: the 'Green Gold' of NTFPs: Nature, Characteristics and Distribution

Bamboo is a tall perennial, arborescent grass that botanically belongs to the subfamily of Bambusoideae, and family Poaceae (Surendran et al., 2003) and is known to be one of the fastest growing plants (Lessard & Chouinard 1980; Kigomo, 1995; Liese, 2003). The bamboo plant is made up of an underground (rhizomes, roots, and buds) and aboveground axises (culms, branches, and foliage (Kigomo, 1995). In terms of taxonomy, it is considered as a giant grass.

Bamboos range from the size of grass to a giant of 40 meters in height and 30 cm in diameter (Dwivedi, 1993; Kosso, 2001). Ecologically, bamboo plants have tree-like functions (Dwivedi, 1993; John & Nadgauda, 2002; Yuming et al., 2004). Once established, most bamboo species continue to be perennial until they flower and then die (Lakshmana, 1994; John & Nadgauda**,** 2002).

Culms*2* of most bamboos are hollow and erect; but some have solid, and either erect, scandent or climbing culms (Liese 1985). The culm consists of internodes and nodes, usually hollow with transverse diaphragms at the nodes (Liese 1985). Bamboos reach their full height range of 15-30 meter and diameter of 5-15cm within a period of 2-4 months by diurnal height growth rates of ca. 20-100cm (Liese, 2003). Bamboos can be classified based on the nature of its different parts (Wong, 2004). Classification can be based on the nature of the rhizome; the growth habit of bamboos can be classified as Leptomorph (monopodial) and pachymorph (sympodial), depending on species (Cruz & Fellow, 1989; Seethalakshmi and Kumar, 1998). The most confusing aspect of the bamboo life cycle is its flowering behavior (Banik, 1993). Unlike other plants, flowering in bamboo can be considered as one of the most distinctive characteristics and can be used for identification (John & Nadgauda, 2002). The flowering nature is distinctly different even among species (Anantachote, 1988).

There are many misunderstanding regarding the flowering manners of bamboo. Bamboo is mostly monocarpic: following its flowering, the bamboo plant dies (Chaturvedi, 1988). However, there are also some bamboo species, which Culm: a stem of bamboo divided in to internodes by the nodes, may be solid or hollow depending on the species (Dictionary of Forestry, 1998)

flower every year and do not die after flowering (Seethalakshmi & Kumar, 1998). Anantachote (1988) stated that the morphological characteristics of bamboo seeds are also distinctively different like that of flowers and can be used for species identification. The size and shape of bamboo fruits vary according to the species and their morphology is a dependable character for identification of bamboos (Seethalakshmi & Kumar, 1998). The age of a culm is difficult to determine for those with three to seven/eight years. Generally, culms, which are 3-5 years old, are considered 'mature' (Banik, 1993).

Bamboo occurs naturally in the natural vegetation of the tropical, sub-tropical, and temperate regions of the globe except Europe, western Asia, and Antarctica (Banik, 1995), and globally about 14 million hectares are distributed in these regions (Zhu et al., 1995). There are about 75 genera (Scurlock et al., 2000) and 1500 species of bamboos in the world (Bystriakova et al., 2004). Tropical Asia has referred to as the centre of bamboo diversity, 45 genera and 750 species. Five hundred species in 40 genera are recorded in China (Yuming et al., 2004). Africa has a relatively smaller area distribution i.e. from the south side of the southern Mozambique (22ºS) to the north side of the eastern Sudan(16ºN), which is the centre of bamboo distribution in Africa and which include many countries such as Nigeria, Cameroon, Gabon, Ethiopia, Kenya, Madagascar etc (Kigomo, 1988). Africa has about 43 bamboo species on over 1.5 million hectare of land (Kigomo, 1988).

Ethiopia is one of the Africa countries, which has two species and the largest area of bamboo coverage followed by Kenya (150,000 hectares and one species). Ethiopia has over one million hectares of highland and lowland bamboo resources (Ensermu et al., 2000; Kassahun, 2003). The coverage of lowland bamboo was estimated to be 700,000 ha, about 481 000 ha were mapped and partly surveyed for the 1997 study and the highland bamboo

is estimated to cover 300,000 ha (Kassahun, 2003). *Oxytenanthera abyssinica* is characterized by its vegetative and reproductive plant part. The plant is long-lived and fast growing. It is prominent in river valleys and locally on the escarpments of the Benshangul Gumuz Regional State (Ensermu et al., 2000). It occurs between 1100-1700 m a.s.l. It co-exists with several other species especially the Combretum-Terminalia broadleaved deciduous woodland vegetation common to this part of the country (Sebsebe et al., 2003). The region has more than 400,000 ha of naturally growing bamboo; and 77,947 ha found in Assossa woreda (Luso, 1997). But it is likely that the area of Ethiopian bamboo has been shrinking since 1997, due to anthropogenic impacts and low development initiatives.

2.3. Uses and Values of Bamboo

Bamboo has various types of uses and benefits for humans. Some uses are like: house construction, animal fodder, and human food, as an agroforestry species (Maoyi, 1994; Christanty et al, 1997), for maintaining soil fertility (Lakshmana, 1994; Christanty et al., 1996; Mailly et al., 1997), as source of cash income and as medicine for treating many types of diseases (Pole, 2002; Yuming et al., 2004). Bamboo has a considerable potential for socioeconomic development (Baghel et al., 1998; Kumar et al., 1998; Perez et al., 2000; Sharma et al.,1998; Kumar & Sastry, 1999). It can populate and protect exposed areas and provide microclimates for regeneration of tropical forests (Kumar & Sastry, 1999). It is also significant with regard to combating degradation of mountains, ecosystems and natural resources (Bystriakova et al., 2004; FARM Africa, 2004; Yuming et al., 2004).

Bamboo is one of the most useful multi-purpose plant resources and NTFPs. It has enormous potential for alleviating many problems both environmental and social – that face the world today (Quintans, 1998). Bamboo is a relatively sustainable and easily produced crop. Once it has become established, it can be harvested and regenerated without replanting. Bamboos are quite fast and efficient by comparison with tropical timber trees, which have 2-10 times longer life cycles (Quintans, 1998). Harvesting of bamboo is frequent since it reaches maturity within 3-4 years, and new shoots appear regularly and in great numbers. Bamboo has suite of features, which lend it to a legion of uses: strength, straightness, hardness, hollowness, lightness and rapid growth among others. Bamboo also

finds a major use in the rayon, handloom, fishing and, sericulture industries (Kumar & Sastry, 1999), in reclaiming degraded areas and for erosion control (Kimmins, 1997; Kumar & Sastry, 1999). The products made from bamboo, as well as the raw materials themselves, find international demand, and so are able to generate much needed foreign exchange for cash-poor developing countries. Their economic contribution compares well with that of timber, and in some cases is even greater than that of timber (Perez *et al.,* 2000). Annual trade earns 5-7 x 10^9 US$ from bamboo whereas tropical timber earns 8 x 10^9 US$ (Banik, 1995; Maxim, 2005). Of total world imports of bamboo products, 71% went to Japan, the European Economic Community (EEC), the USA and Hong Kong in 2000(Widenoja, 2007). The US was the largest market, accounting for 32% of exports, and Japan was next (Widenoja, 2007). According to INBAR's trade database, in 2005 the global and national trade in bamboo and bamboo products was estimated to be worth over 4.5 x10^9 US$, which represents an enormous potential for poverty alleviation and rural economic growth. Cultivation of bamboo can provide a cost-effective return in the short term (Shanmughavel & Peddappaiah, 2000), and can provide significant proportion of the national income. For example, China earns US$130 million annually from the export of edible bamboo shoots (Kumar & Sastry, 1999). Bamboo increases its biomass by 10-30% per annum, which far exceeds the growth rate of trees, which is 2-5% per annum. Bamboo creates greater yields per unit time of raw material for use (Widenoja, 2007). These characteristics of bamboo make it a potential alternative to other wood types.

According to Environmental Bamboo Foundation, bamboo's growth habits allow it to release 35% more oxygen than equivalent stands of trees and some bamboos even sequester up to 12 tonnes ha^{-1} yr^{-1} of carbon dioxide from the air. This makes bamboo ideal for offsetting air pollution, and, therefore, a preferred species for trading in "Carbon Credits."

Despite the fact that bamboo has a considerable potential for the economic development of African rural people, their utilization is very minimal and it has not been exploited fully, (Bystriakova et al., 2004). In Ethiopia, the use of this resource is restricted to household level; the primary use of the bamboo material is for housing, fencing and household

amenities. In Ethiopia, most of the bamboo transaction is on local markets and prices, mostly dominated by raw bamboo products. The current market values are not attractive for such materials unless they are harvested from the naturally grown stands. In Ethiopia, marketing of processed bamboo products is very traditional, at a low level of development, and informal (Ensermu *et al*., 2000). According to Berhanu & Jochen (2007), the market system is not broad-based and integrated over geographic locations, sales points and customers, *etc*. As Mulugeta (nd), estimates indicate that Ethiopia could harvest 3 million tons of oven dry bamboo biomass and generate approximately 9.5 billion birr annually. At present, the gross annual value generated from bamboo is not more than 95,000,000 Birr or 1% of this potential.

In Assosa, the local community members produce bamboo based goods and sell the products, either themselves or to local traders, who take the products to nearby markets. The local products are largely traditional, and are consumed by the communities themselves for their regular agricultural and home activities.

2.4. Rural livelihood strategies

A livelihood is outlined as the activities, the assets (both material and social), and the access that together determine the living gained by the individual or household. These assets, considered as building blocks of livelihood systems are classified into five categories. These are the natural, human, financial, social and physical capital (DFID, 2000). Livelihood strategies are composed of activities that generate the means of household survival. These are divided between natural resource- based and non–natural-resource based activities. Depending on the use of livelihood framework different ideas for rural livelihood strategies are generated. According to Dalal- Clayton (2003) there are three main livelihood strategies: natural-resource-based, non-naturalresource-based, and migration, but according to Scoones (1998) the strategies are based on agricultural intensification or extensification, livelihood diversification and migration. Even if the words are different, the classification of the different livelihood strategies is more or less the same. Rural livelihood diversification is then defined as the process by which households construct a diverse portfolio of activities

and social support capabilities for survival and in order to improve their standard of living (Ellis, 1999).

A range of assets and strategies are needed to achieve positive livelihood outcomes for rural poor people. No single category of asset and/or strategy sufficiently provides all the many and varied livelihood outcomes that people seek (Warner, 2007). A good number of them are natural resource based as opposed to non-natural resource based activities (Ellis, 2000). Scoones (1998) defined sustainable livelihood analysis as the process of identifying the resources and strategies of the poor, the context within which they operate, the institutions and organizations with which they interact and the sustainability of the livelihood outcomes which they achieve. This approach emphasizes towards focusing on every rural enterprises and resources in an interdisciplinary way for poverty alleviation. Much literature has stated the positive effect of non-farm economy on the livelihoods of the rural farmers (Ellis, 2000; Ellis et al., 2002; Davis, 2003). Forestry and the related society with their skill and knowledge are vital among these resources contributing for rural livelihood improvements. Forestry is one of the tools through which poverty alleviation is possible (Negi, 1998). Bamboo is a vital component of development and an effective means of improving the livelihood of the rural poor people. The number of bamboo users is enormous, quite likely running into thousands of millions. In China, there are millions of farmers who grow bamboo as a component of their integrated farming systems. In other countries, the number of people who depend on bamboo is smaller; but wherever bamboo is found there are people who depend on it, completely or in part, for their livelihood, and many of them are very poor. The recent empirical research of Davis (2003) has interesting insights on non-farm economy under which bamboo enterprise falls into. Chihongo et al. (2000) also found out that bamboo has the potential of improving the livelihood of the people, particularly those in rural areas and in the informal sector in Tanzania.

2.5. Contribution of Forests and Bamboo products for Community

Forest products provide diverse uses for rural people especially those who reside near or in the forest. Tropical forests as CIFOR, (2004) are valued for their direct economic benefits and for the host of intangible benefits they confer to society. In many parts of the country,

forestry complements livelihoods in rural Ethiopia, and in recent years this phenomenon has risen significantly. People who live in forest environments and who practice hunting, collecting and shifting agriculture draw heavily on forest products, not only for subsistence but also as source of income (Asfaw, 2008). For many Ethiopians, the money earned from collecting, selling or processing forest products provides an essential input to household income enabling them to buy food and invest in future food production (Viveropol, 2002).
Level of income and dependency
as well as market conditions govern the way people manage local bamboo. Household composition, gender and age structure are more important for assessing dependency and contribution of bamboo. Large households clear more forest than small, both because they have more workers and more mouths to feed (Adhikari et al, 2004). Distance from forest, household total income, adult labor and household size are among the factors that influence people's dependence on forest resources. Non-timber forest products (NTFPs) have played a dual role in forest dwellers' livelihoods; for subsistence and as commercial products that contribute to the household cash economy (Perez *et al*., 2000). The extraction, processing, consumption and sale of non-timber forest products (NTFPs) are crucial elements of the livelihood strategies across a variety of settings.

Rural households use bamboo resources extensively for living, not enough is known about their quantitative contribution of non-marketable uses to rural livelihoods for in the area. However, Campbell and Luckert (2002) stated that the assignment of value to non-market goods and services from natural resources is of critical importance to the economies of less developed countries, owing to the dependence of the rural livelihoods in these countries on natural resources in general, and trees and forests in particular. Generally, full of its contribution to livelihoods in the study area is not properly investigated and documented and served as a basis for decisions. As a result, the sector has given little priority in economic policies and development efforts. Filling this information gap, the contribution of bamboo for the livelihood of the community is vital for betterment. So, livelihood surveys are important so as to consider all of the economical, ecological and local socio-cultural values of bamboo.

2.6. Existing troubles on Bamboo resources of Ethiopia

There is already pressure on the existing cover of East African bamboo and a need, therefore, to protect and manage properly the remaining scattered bamboo resource (Kigomo, 1988). Kigomo (1988) suggested that generation of information on the proper management of this resource is a prerequisite for sustainability of bamboo utilization and livelihoods. He also noted that exploitation of indigenous stands of bamboo is not controlled by a management order. As opposed to most forestry programs on trees, Kigomo (1988) observed that the two common East African species, *0reobambus buchwaldii* and *0xytenenthera abyssinica* are not on the management agenda in most departments of forestry.

Agricultural land expansion is almost eliminating the bamboo forests of Ethiopia, and the biological diversity associated with them. The present government has given top priority to the agricultural sector in order to increase its productivity (Thomas and Bekele, 2003). The present regime decentralization and investment policies are also negatively affecting the bamboo. Largescale export-crop production is taking place in fragile ecosystems for short-term gains, e.g. forest clearance for cash crop farming like sesame. These activities are emerging as real and potential threats to the unique biological resources- bamboo.

Grazing and browsing occur over more than 50 % of the national territory. This land use puts heavy pressures on woodlands and forests. Because pastures are not owned by individuals or by specific groups, rangelands are victim of the **"**tragedy of the commons**"** that lies behind their exploitation well above carrying capacity (Thomas and Bekele, 2003). Besides, in the area *O.abyssinica* is flowering gregariously. The negative outcome of bamboo flowering is documented in many research findings like (Hadjikyriakou, 2001; Banik, 1994; John & Nadgauda, 2002).

This may be turn out to be a dangerous situation for the species in the area because culms die out after flowering (Kassahun, 2003). This scenario was observed in many areas within the Assosa Zone where *O. abyssinica* died out after flowering and seed formation. This is because of human and animal interference and other environmental impact in the natural regeneration of the species. Considering the long flowering and seeding cycle of bamboos, the seeds are very valuable, and any loss due to various factors is of great concern (Mohanan, 1997).

Lack of periodic assessment of diseases and pest status for avoiding likelihood sudden destruction. There are different types of disease that affect different parts of a bamboo plant such as the rhizome, roots, culm, foliage, branches and minor branches, inflorescence[3], and seeds from bamboo stands (Mohanan, 1997). Especially, fungi, bacteria and other microbes invade bamboo seeds, during different developmental stages while they are still on the plant and after the seeds fallen to the ground. This reduces the amount of healthy seeds since embryos are infected and do not germinate (Rao, 1994).

Bamboos are versatile renewable resources, with a high potential for socioeconomic development and for environmental improvement. The values of bamboo are being satisfactorily utilized by tropical Asian countries (Yigardu and Mengiste, 2007). Bamboo shoots are a popular food in Asia, and the nutritional value is comparable to those of many commercial vegetables (Suwannapinut and Thaiutsa, 1990). They are also consumed in Ethiopia by the rural people living near the bamboo forests, albeit less popular. Boiled rhizomes are also eaten in these areas. There are reports indicating that "enset" *(Ensete ventricosum)* helped the Ethiopian people to limit the effects of drought and famine. Bamboo could also, probably, be used to supplement food requirements in Ethiopia. A panel held under the theme *Drought in Ethiopia* on 19 August 1999, in Addis Ababa, recommends, among other things, drought resistant crops and incomegenerating activities to resist and minimize the effects of recurring drought (Walta, 1999). As a multipurpose, drought resistant species, bamboo (particularly the lowland species) is suitable for these objectives (Kassahun, 2000).

According to Kassahun (2000) because it is a fast growing plant, which is adaptable to low quality sites (particularly lowland species) bamboo has the capacity to redress many of the problems in large areas of Ethiopia. It has high soil conservation potential. The rhizomes and roots grow in all directions forming a complex network of up to more than 1 m depth belowground, which effectively holds soil particles together, thereby, preventing soil erosion and promoting water percolation (Kassahun, 2000). The aboveground part of bamboo helps to reduce erosion caused by rain, by interception, and also shelters the soil

[3] The flowering portion of a plant; the flower-head (Dictionary of Forestry, 1998).

from wind erosion (Christanty et at, 1996). Bamboo litterfall improves soil structure and fertility (Christanty et at, 1996).

Bamboo has effectively restored the vegetation cover in denuded lands in the Philippines (Bumarlong and Yagi, 1984). Bamboo has various advantages from livelihood development perspectives. According to Belcher (1995), the beauty of bamboo from this perspective is that it is an important commodity at many different levels of the economy; it is a subsistence crop and a source of income to people with very limited opportunities to earn cash income. This entails urgent initiations of development decisions and implementation efforts regarding improvement of the lowland bamboo vegetations.

CHAPTER THREE

3. RESEARCH SITE AND METHODOLOGY

3.1. Description of the Study Area

Benishangul-Gumuz National Regional State (BGNRS) is one of the nine regional states established in 1994, as stated on FDRE constitution article forty six number one . Previously the southern part of BGNRS belonged to Wollega while the area above the Abay River to Gojjam. The region is located in the western part of the Country between 34° 10'N and 37° 40'E; and in the latitude 09° 17'N and 12° 06' N

The region has international boundary with Sudan and south Sudan in the West and is bordered by the Amhara region in the North and Northeast, Oromiya in the Southeast and South. The regional capital, Asossa is located at a distance of 687 km west of Addis Ababa, the capital city of Ethiopia. The region has a total area of approximately 50,380 km2 with altitude ranging from 580 to 2,731 meters above sea level (m.a.s.l.).

BGRS is divided into 3 administrative zones and 21 '*Woredas*' (administrative unit equivalent to district*)*. Based on CSA (2007) data, the total population of the region is about 670,000 people, and the total population of the region is projected at 711, 702 people in 2009. Population density is sparse with a regional average of 14 people per square kilometer. The smallest population density is estimated at 3 persons per square kilometer and recorded in Guba, Yaso, Dangur and Sirba Abay districts while the largest population density is estimated at 62 people per square kilometers, which are recorded at Assosa, Mandura, Bambasi and Pawi districts (CSA, 2007).

Agricultural land is abundant with a mean land holding size of 3.7 hectare. The average number of family members of a household in the region is 6.7. Of the total population, 92.2 percent lives in the rural areas and 7.8 percent is urban population (BGRFSS, 2004). The population composition of the region has diverse ethnic groups, five of which are indigenous. Based on their languages, "the five indigenous1" ethnic groups in their order of population number are Berta (26.7 percent), Gumuz (23.4 percent), Shinasha (7.0 percent),

Mao (0.6 percent) and Komo (0.2 percent). Significant numbers of Amhara (22.2 percent), Oromo (12.8 percent) and others (7.1 percent) also reside in the region.

The religious affiliation of the population of the region is Muslims (44.1 percent), Orthodox Christian (34.8 percent), traditional religions (13.1 percent), Protestant Christian (5.8 percent), Catholic (0.5 percent) and others (1.5 percent). Agro-ecologically, it is classified into *Kolla*about 75 percent (lowlands below 1500 m.a.s.l.), *WoinaDega*about 24 percent (midland between 1,500-2,500 m.a.s.l), and *Dega*about 1 percent (highland above 2,500 m.a.s.l.).

The region is characterized by a monomodal rainfall. According to the classification of rainfall regimes given by the National Meteorological Service Agency, Benishangul-Gumuz region is characterized by a wet season from April to October. Annual rainfall varies from 800 to 2000 mm. The temperature reaches a daily maximum of 200C to 250C in the rainy season and rises to 350C to 400C in the dry season. The minimum daily temperatures range from 120C to 200C, depending on season and altitude. The hottest period is from February to April.

The incidence of poverty in the region is 54 percent (MOFED, 2004) and 93.2 percent of the population depend on shifting-cultivation agriculture for income. However, the incidence of poverty has declined markedly from 54 percent to 28.9 percent in the year 2004/05 to 2010/11 (MoFED, 2012). This source reported that the annual income per household from both agriculture and non-farm activities range from Birr 169 to Birr 1499. Currently, the region is attracting the attentions of the Federal government and other stakeholders' intervention because of the Renaissance Dam of Ethiopia, which is under construction in the region. Benishagul-Gumz region is endowed with fertile land suitable for high value crops, livestock, apiculture, fishery,minerals like gold and marble, and economically important trees like bamboo and incense. Livestock production is important means of livelihood in the region next to crop production. It is important sources of food, cash income, and assets to buffer against shocks. In general, a mixed farming system, involving both crop production

and livestock rearing activities, is the dominant type of production system. According to the CSA (2007) agricultural sample survey, the region had about 0.4 million cattle, 0.3 million goats, 0.1 million sheep, and nearly one million poultry.

In terms of land-use patterns, the region's landmass is predominantly comprised of bushes and shrubs 77.4 percent, while forestland constitutes about 11.4 percent. Further, cultivated land, grazing land and marginal land constitutes about 5.3 percent, 3.2 percent and 2.3 percent, respectively. The vegetation classified into eight types, namely: dense forest, riverine forest, broad-leaved deciduous wood lands, acacia woodland, bush land, shrub lands, boswellia wood land and bamboo thickets (INBAR, 2010). About 0.2 hectare (89 percent) of the total land of the region is covered with vegetation. Evidences in the region revealed that the lowland bamboo forest grows between 1000 and 1800 m.a.s.l and on poor soil in dry vegetation formation (LUSO CONSULT, 1997). It also tolerates poor rocky soil, in erratic annual rainfall even down to about 600 mm and in high temperature of above 35°C. The highland bamboo grows in altitudes from 2.200 -3.500 m.a.s.l and the lowland bamboo between 700-1800 m.a.s.l (Liese, 1989).

3.2. Method of Data Collection and Data Analysis

In this section, methods of data collection, methods of data analysis and other related are indicated. Furthermore, this section also presents the method in which the results are presented in the study.

3.2.1. Data Requirement

Data and information required for the purpose this study were collected from both primary and secondary sources. The main sources of information were from primary data that were generated through the use of formally developed questionnaires, interviews and field observation.

The sources of primary data were collected from sample kebeles in Assosa, namely, Abrhamoo and Abendemengda . Secondary data particularly on production and income generation of small holder farmers in the target areas, micro climate change on the study

area and other relevant information were collected. The data and information were collected from the Assosa district environmental protection office; Assosa district agricultural and rural development office and from the surrounding kebeles' administration offices.

In addition to this, reports from non-governmental organizations (NGO) like UNHCR, IOMS, ARRA INBAR were used, Information with regards to population and physical aspects of the study area were also collected from various documents published by the CSA, Ethiopian Mapping Authority (EMA) and Ethiopian Meteorological Services (EMS).

3.2.2. Sampling Techniques /sampling procedure and sample size

A multi-stage sampling procedure was used to select target kebeles and sample respondents. At the first-stage, the district was stratified through Bamboo resource availability, Bamboo production and Bamboo product utilization. The next step was the random selection of Kebele from each stratum using simple random sampling. Finally, sample Household heads were randomly selected from the two kebeles based their administration arrangement to household head respondents rather than including all that are engaged in the income generation and also homogenous nature (livelihood, culture, religion, language, bamboo production practice and the area they dwell) of the householders.

The number of household of Abrhamo and Abendem engda is 451 and 220 respectively among this the sample size selected 154(102 from Abrhamo and 52 From Abendem engda) householder from both target kebeles based on their engagement on the bamboo products.

3.2.3. Method of Data Analysis

After collecting the required data, it was analyzed using the software Statistical Package for the Social Sciences (SPSS) of version 20 or 22. Descriptive and inferential analysis was used to interpret the data.

Descriptive statistics: frequency, percentile and graphic distribution were used for description. Also, inferential statics such as correlation and regressions were used to show the association and relationship between dependent and independent variables.

3.2.4. Variable Specification and Hypothesis

3.2.4.1 Variable Specification

Based on literature and research journals, the following variables are used for this study:

3.2.4.1.1. Independent Variables

The independent variables are the factors that can be varied or manipulated in an experiment. The independent variables are variables that will have hypothesized to influence the dependent variable. The independent variables in this study are the attitude of farmers, the skill of the farmers, the support level of stakeholders, accesses level of bamboo.

3.2.4.1.2. Dependent Variables

The dependent variable is the variable that is simply measured by the researcher. It is the variable that reflects the influence of the independent variable. In this study, dependent variables are the production of bamboo and amount of income from bamboo production.

3.2.4.1.3. Hypothesis

$H_1$the attitude of farmers have a negative relation with the skill of the farmers and bamboo production to income generations for small holders farmers.

$H_2$the support level of stakeholders has a positive relation with access level of bamboo

H_3 the attitude of farmers, the skill of the farmers, the support level of stockholders, access level of bamboo have a negative relation with the production of bamboo and amount of income from bamboo production.

CHAPTER FOUR

4. DATA FINDING AND DISCUSSION

4.1. Introduction

This chapter presents the analysis and interpretation of data collected from Asossa woreda female and male farmers from target kebeles such as Abrhamo and Abendemengida .The results of the research were presented and discussed following the research methodologies presented in chapter three. This chapter is divided in to four parts. The first introducing the chapter and showing the questioner responding rate or validity of the study the second part discusses the characteristics of the respondents while the third part deals with the analysis of the data in order to propose the main findings in line with answering the research questions discussed with descriptive statics and the fourth one is show the association between major factors and contribution of bamboo to income generation for small holder female and male farmers by using inferential statistic in Abrhamo and Abendemengida in Assosa woreda.

4.1.1. Returning rate of questioners

In this study, the researcher distributed 154 questionnaires to the respondents, of which 150 questioners were returned. According to Mugenda (2003), response rate refers to percentage subjects that respond to the research instrument. A response rate of 50% is deemed adequate for analysis and reporting, a response rate of 60% is good and a response rate of 70% and over is considered very good. In the light of this, the study is deemed to have given a superior questionnaire return rate.

4.1.2. General characteristics of the respondents

4.1.2.1. Respondents by age

Concerning age distribution of respondents based on table 4.1, the respondents below 20 years old were 10 (3.8%), age group between 20-25 years old were 32 (21.3%), and

respondents between 26-30 years old were 56 (37.3%), the age category which the majority of respondents is grouped. Age group from 31-35, were 26 (17.3%), and age group of 36-40 were 6 (4%). Thus, from the age category indicated the majority of respondents were in the required age group to be working in the rural Kebele for bamboo production.

Table 4.1: Characteristics of respondents by age

No.	**Items**	No. of respondents	Percentage
1	**Below 20 years old**	6	4
2	**20-25 years old**	32	21.3
3	**26-30**	56	37.3
4	**31-35**	26	17.3
5	**36-40**	24	16
6	**Above 40years old**	6	4
Total		150	100

Source: - Owen survey2018

4.1.2.2. Respondents by sex

As indicated in table 4.2, 128 (85.3%) and 22 (17.7%) were male and female, respectively. This showed that the number of female respondents was less than their male counter parts.

Table 4.2: Respondents by sex

No.	**Items**	**No. of respondents**	**Percentage**
1	**Male**	128	85.3
2	**Female**	22	17.7
Total		**150**	**100**

Source:- Own survey2018

4.1.2.3. Respondents by marital status

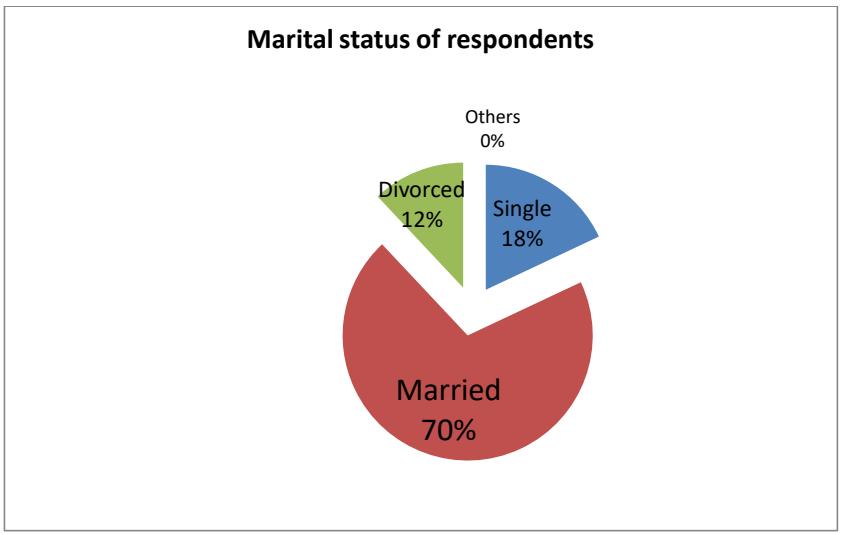
This characteristic was of great importance to the study as it would help reveal the extent to which marital status of the respondents would influence the composition of farmers in the sampling kebeles, and also how this gender factor would contribute in using of bamboo products as source of income for small holder farmers. In this respect, the respondents were asked to complete the questionnaire and in table 4.3, it revealed that the respondents who filled the questionnaire 27 (18%) were single, 105 (70%) were married, 18 (12%) were divorced. The respondents were many married persons formed a formidable working force in Assosa woreda.

Table 4.3: Characteristics of respondents by marital status

No.	Items	No. of respondents	Percentage
1	Single	27	18
2	Married	105	70
3	Divorced	18	12
4	Others	00	00
Total		150	100

Source: - Own survey 2018

Figure 1: Marital status of respondents



Source: - Own survey 2018

4.1.2.4. Respondents by education level

Level of education was regarded as a crucial determinant of choice and preference that people make concerning different types of production in specific sectors. In this study, the researcher was interested in establishing the pattern of education of the farmer's in Abrhamo and Abendemengida kebele in Assosa woreda. As depicted below in Table 4.4 the education level distribution of respondents reveals that, there was no respondents in1the education level of secondary, and level/ diploma. The result indicated that majority of the Assosa woreda farmers i.e. 79 (52.3%) of the farmers in the selected Kebele were able to write and read. The non educated i.e. the illiterate accounts to 51(34%) of the respondents while 29 (13.4%) are completed secondary education.

Table 4.4: Characteristics of respondents by education level

No.	Items	No. of respondents	Percentage
1	illiterate	51	34
2	**Reading and writing**	79	52.7
3	Elementary education	29	13.3
4	Secondary education	00	00
5	Level/diploma	00	00
Total		150	100

Source: -Own survey 2018

4.2. Factors Affecting the Bamboo production for Income generation

4.2.1. The attitude of farmers towards bamboo production to income generation

As indicated on the table 4.5 the Abrhamo and Abendemengida farmers have good attitude towards bamboo production or using of bamboo for different activities. From 150 respondents for the questions "you have a good interest to use Bamboo for traditional activities"69 (23.3%) said that strongly agreed, 49 (32.7%) said that agree and 24 (32.7%) becomes neutral. Only 8 (11.3%) disagreed for this questions and no respondent responded that they strongly disagree. The respondents also asked on the second question in this section that whether they believe that planting and cultivating bamboo tree is important for Income generation. Out of the total 150 respondents all of the respondents (n= 78 (52 %) said they agreed and n=71 (47.3%) said strongly agreed) while only 1 (7%) responded neutral.

The respondents also believe on bamboo is multidimensional important. As it as seen on table 4.5 almost all of the respondents (98 %) reacted agree (n=80 (53.33%) strongly agreed and n=68 (45.33 %) said they agree) while only 1 (7%) of respondent is neutral and 1 (7%) disagree on the questions raised.

The respondents are also asked whether bamboo alone can be a sources of income for farmers. At this point 63 (42%) farmers disagreed (which is n=58 (38.7%) strongly disagree and n=5 (3.3%) disagree) that bamboo as a single source of income for farmers. Here 11 (7.3%) become neutral and the rest 76-(50.7%) (which is n=57 (38%) said agreed and n=19 (12.7) said strongly agree. The target community is well aware on using bamboo on traditional activity, like by selling bamboo Culm within their kebele as well as at woreda town for different purpose (furniture machining, construction purpose and for the purpose producing traditional music instrument "Zumbara".

In addition to this, it has been observed in the field trip special purpose of bamboo shoot known as "quntso" ; they use bamboo shoot as a food when the time rainy season as a subsidy for their family by collecting from bamboo forest which is a unique utilization of bamboo by this Berta Community in region as well in Ethiopia. So based on the research output indicated that both sex engaged on bamboo shoot and bamboo Culm collection for their family for food as well for income.

Thus, implies the community attitude very positive and their life also depend on bamboo and bamboo product but until today they haven't have enough support through training, technology to upgrade the utilization and to improve the contribution of bamboo for their income like other Asia countries.

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Table 4.5: The attitude of farmers towards bamboo production for income generation

No	*Descriptions*	1	2	3	4	5
1.	You have a good interest to use Bamboo for traditional activities	0%	8 (11.3%)	24 (32.7%)	49 (32.7%)	69 (23.3%)
2.	You believe that planting and cultivating bamboo tree is important for Income generation.	0%	0%	1 (7%)	78 (52 %)	71 (47.3%)
3.	You are attracted by bamboo products in home	0%	0%	6 (4%)	56 (37.3%)	88 (58.7%)
4.	Bamboo is multi-dimensional important plant	0%	1(.7%)	1 (.7%)	68(45.33%)	80 (53.33%)
5.	Bamboo alone can be the sources of income for farmers.	5 (3.3%)	58 (38.7%)	11 (7.3%)	57 (38.0%)	19 (12.7%)
6.	I use bamboo production for income generation.	4 (2.4%)	6 (4%)	20 (13.3	81 (54%)	39 (26%)

(5=Strongly Agree, 4=Agree, 3=Neutral, 2=Disagree, 1=Strongly Disagree) N= 150=100%

Source: -Own survey 2018

4.2.2. Skills of the farmer towards bamboo production to income generation.

As we know the skill is very important for any production as to increase and use the production as means of income. Based on this, the researcher asked the skill related questions about the contribution of bamboo production for income generation. The first question was "Do you have the skill for making handicraft to use bamboo for income generation?" For this question from 150 respondents 58 (38.7%) said that they strongly disagreed, 48 (32.0%) disagreed. this response comprises around 70.8 % (116) of the respondents. twenty respondents (13.3%) become neutral. But 16 (10.7%) agreed and 8 (5.3%) strongly agreed.

They were also asked whether they do not have skill gap of knowledge for producing bamboo for income generation. And 114 (76%) respondents (n=25 (16.7) strongly disagree and n=89 (59.3%) disagree) this question. As a result the respondents agreed by saying we have the gap of skill to produce the bamboo while 30 (20%) of respondents become neutral for the question and only 6 (4%) agreed on they have no skill gaps. The result showed on the responses of the respondents indicated that farmers have no the skill to produce the bamboo to income generation. They need practical skill training about the bamboo production to generate income by using it.

Furthermore, 138 (92%) of them indicated that they know and skill is important for income generation of income from bamboo. In addition to this, the respondent also asked whether they have got training on income generation and 64% of them said they do not have skill training for income generation.

The result for this part in general shows that there is a strong skill gap in making handicrafts to value add on bamboo products and generate better income out of it. Even though they know that training have a strong contribution for skill development they responded that they do not get skill for improving their products and income generation.

Table 4.6: Skills of farmers toward Bamboo production

No.	*Descriptions*	1	2	3	4	5
1.	You have the skill for making handicraft to use bamboo for income generation	58 (38.7%)	48 (32.0%)	20 (13.3%)	16 (10.7%)	8 (5.3%)
2.	I have no gap of knowledge producing bamboo for income	25(16.7%)	89 (59.3%)	30 (20%)	6 (4%)	00
3.	Skill is important for bamboo producing for income	0%	0%	12 (8%)	108 (72%)	30 (20%)
4.	I have skill training about income generation by using bamboo products	38 (25.3%)	58 (38.7%)	20 (13.3%)	24 (16.0%)	10 (6.7%)

(5=Strongly Agree, 4=Agree, 3=Neutral, 2=Disagree, 1=Strongly Disagree) N= 150=100%

Source: -Own survey 2018

4.2.3. Support level of different stakeholders

As we indicated above in table 4.6, respondents were asked different types of questions in relation to bamboo plantation and hand craft making training support from Assosa woreda to income generation and the 105 (70%) of the respondents (which is 50 (33%) disagree 55 (36.7%) strongly disagree) disagree respectively. This indicates that they did not get support on bamboo plantation for income generation. Twenty one respondents (14%) become silent or become neutral to say anything about this question and 18 (14%) agreed and 6 (4%) were strongly agreed that they have got support.

The second question about financial support from different stakeholders. For this question from 150 returned question 45(30%) strongly disagreed, 95 (63%) disagreed,10 (6.7%) become neutral. The third and the different stakeholder related support question responded in the following manner. Forty eight respondents (32%) strongly disagree,42 (28%) disagree, 30 (20%) neutral and only 24 (16%) and 6 (4%)agree and strongly agree. The last and non-governmental related question the respondent's response was 49 (32.7%) strongly disagree, 42 (28%) disagree, 30 (20%) neutral 21 (14%), agreed and 5 (3.3%) strongly agreed.

From the above discussion we can generalize that the farmers are not getting the supports from their woreda, from different stakeholders and/or from NGO (non-governmental organizations) morally, financially and materially (bamboo plantation). Therefore, the small holder's farmers are not getting enough support from key stakeholders including government and NGOs to improve the bamboo products and Production to maximize the expected income from the bamboo production.

Table 4.7: Support level of stockholders

No	*Descriptions*	1	2	3	4	5
1.	I get bamboo plantation and handicraft training supports of Assosa woreda about bamboo production for income generation	55 36.7%)	50 (33%)	21 (14%)	18 (14%)	6 (4%)
1.	I get financial supports to use bamboo production for income generation form different stake holders	45 (30%)	95 (63%)	10 (6.7%)	0%	0%
2.	Different stakeholders give me moral supports/advice about bamboo production for income generations	48 (32%)	42 (28%)	30 (20%)	24 (16%)	6(4%)
3.	NGOs (non-governmental organizations) are supporting for small holders to producing bamboo as income sources	49 (32.7%)	45(30%)	30 (20%)	21 (14%)	5 (3.3%)

5=Strongly Agree, 4=Agree, 3=Neutral, 2=Disagree, 1=Strongly Disagree) N= 150=100%

Source: -Own survey 2018

4.2.4. Access of bamboo plant (forest)

The following table indicated that the respondents replied for the stated questions about access of bamboo forest row material. The first question was about access of bamboo product for income generation and they responded that 0% strongly disagree, 1 (.7%) disagree, 6 (4%) neutral. But 143 (90%) generally agreed. And the second question was "was bamboo scarcity the problem for production to income generation?" and 144 (98 %) generally disagreed but only 6 (4%) becomes neutral for this question. The third question was "do you have the access of natural bamboo forest nearby?" 6 (4%) neutral then 108 (72%) and 30 (20%) agree and strongly disagreed for this question. But for the fourth question "I have a human made forest with short distances"122 (81.3%) disagreed and 28 (18.7%) become neutral.

From the above discussion referring to table 4.8 we suggest that there is no shortage of bamboo forest. This means we cannot say the access level of bamboo is not the factor for the contribution of bamboo production for income generation. Table 4.8 also attempted to show access of farmers for bamboo tree. One hundred thirty five (90%) of the respondents agree that they have access to use bamboo products for income generation. Furthermore, 138 (92%) of the respondents added that they can get plenty of bamboo from the natural forest nearby. The result shows that there is no problem in accessing bamboo tree for income generation.

On contrary, the target female and male farmers were also asked whether there is scarcity of bamboo production for income generation. But, 144 (98%) of the respondents said that scarcity of bamboo production is not main problem in income generation. One hundred and twenty two respondents (81.3%) also said they do not have human made forest with a short distances. This is an indication that they have access only for communal forest but not for human made forest . This is one of the problems of the target household because they depend only on communal forest not on human made bamboo forest in the study area. This suggests that the target community depend only on natural forest which means there is no afforastation activities for future utilization As a result while there is no problem in accessing bamboo on natural forest/communal forest but there is scarcity of the man made bamboo forest which means the community depended on natural forest /communal forest/.

Table 4.8: Access of bamboo plant (forest)

No	*Descriptions*	1	2	3	4	5
1.	I have the access to use bamboo products for income generation	0%	1 (.7%)	6 (4%)	72 (48%)	63 (42%)
2.	Bamboo scarcity is my problem to use products for income generation	42 (28%)	102 (68%)	6(4%)	0%	0%
3.	I can get plenty of bamboo from the natural forest nearby	0%	0%	12 (8%)	108 (72%)	30 (20%)
4.	I have human made bamboo tree with a short distances	51 (34%)	71 (47.3%)	28 (18.7%)	0%	0%

5=Strongly Agree, 4=Agree, 3=Neutral, 2=Disagree, 1=Strongly Disagree) N= 150=100%

Source: - Own survey 2018

4.2.5. Level of Bamboo production

In this study, the researcher raised different questions about production level of bamboo in their surroundings to generate the income in their live. The first question was "Low bamboo production is caused by different factors". For this question 36 (24%) strongly disagreed, 92 (61.1%) disagreed,10 (6.7%) and12 (11%) agreed. For the second questions "are you getting high bamboo productions" 11 (7.3%) strongly agreed, 124 (82.7%) agreed,5 (3.3%) neutral and 10 (6.7%) disagreed. Based on the data discussed the respondents the production is not the problem for income generation for small holders in Abrhamo and Abendemengida kebeles in Assosa woreda.

Table 4.9: Bamboo production level

No.	*Descriptions*	1	2	3	4	5
1.	Low bamboo production is facing by different factors	36(24%)	92(61.1%)	10(6.7%)	8(6.3%)	4(2.7%)
2.	I am getting high income from bamboo productions		10(6.7%)	5(3.3%)	124(82.7%)	11(7.3%)
3.	High bamboo production is expected because of different factors.	3(2%)	6(4%)	15(10%)	100(66.7%)	26(17.3%)
4.	Bamboo production varies from season to season	21(14%)	101(67.3%)	14(9.3%)	3(2%)	11(7.3%)

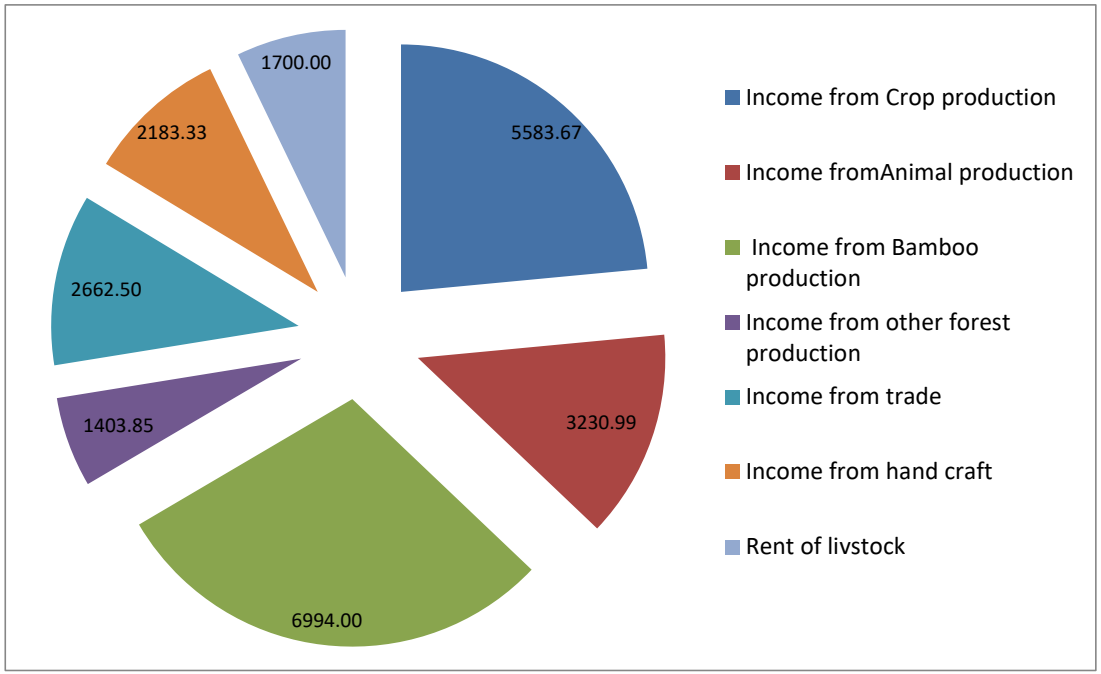
5=Strongly Agree, 4=Agree, 3=Neutral, 2=Disagree, 1=Strongly Disagree) N= 150=100%

Source:-Own survey 2018

4.2.6. Amount of income generation from bamboo

In this study, the researcher raised different questions about income generation capacity of bamboo as compared to Other major income source per annum. The first question was "I am getting high income from bamboo production? " For this question 90% of the respondent strongly agreed. This show that bamboo is a major source of income in the study area. For the second questions "I get low income from bamboo production and I didn't get any income from bamboo production" for both questions 75% of the respondents disagreed. This implies that most of the target female and male farmers use bamboo as one of income source for their life. But they disagreed with the question which says "Throughout my life I did not use bamboo production" since bamboo contribution is very huge particularly for the life of small holder female and male farmers. Based on the data gathered access and , production and income generation capacity are not problems to improve the utilization of bamboo resource but absence of improved technology on value addition, less support of government, NGOs and other respective stakeholder to the small holder farmers. Absence of training and skill improvement activities like supporting through machine, and poor infrastructure like market linkage affected considerably small holder farmers on the utilization of bamboo and bamboo products for the life of small holders at Abrhamo and Abendemengida kebeles, When we see the income contribution of bamboo in the study area, its contribution to the economy of the house hold is very much sounding as compared to many of income sources as indicated on(Figure 3) .

Figure.3. Bamboo Contribution for Income Generation



Average Household Income (by HH head) per annum

4.2.7. Correlation Analysis

Correlation is a comparison of needs, requirements, or functions whereby the user identifies a relationship of either mutual benefit, conflict, or no relationship. If the Pearson relationship value of each pair variable is significant at 0.05 (*) or 0.01 (**), these variable have (positive or negative) relationship significantly. Also, it can explain that these variables can be used to analyze in factor analysis and income from bamboo production. Usually, if the relationship is not significant, that variables should be reviewed again. Table 4.8 shows relationship among independent variable I,e attitude of the farmer, support from different sectors, access of bamboo, and dependent variables productions of bamboo and incomes generated from bamboo production based on the response of respondents by using surveyed questioners. .

As indicated on the below correlation matrix in Table 4.10 farmers attitude and their skill towards bamboo production to income generation is positively related r=0.61 and their *p value is 0.49*. This means that when the attitude of the farmer increase their skill will increase to produce bamboo for income generation. The relationship between the skill of the farmer and income generation from bamboo production is negatively related i.e. r= -.064 and the p-value is.624. This indicated that, low skill of the farmers contributing low income of the farmer from bamboo production. Similarly support and income has negative relationship in this correlation matrix i.e. r = -.074 and p=.368. This implies that, low supports of different stakeholders resulting low income from bamboo production.

Table 4.10: Correlation table between bamboo production for income generation and influencing factors

Pearson Correlation Coefficients, N=150 Probe > |r| under H0: Rho=0							
Variables		**Skill**	**Attitude**	**support**	**Access**	**production**	**Income**
Skill	**Person correlation**	**1**					
	Sig.(2 tiled)						
Attitude	**Person correlation**	**.161**	**1**				
	Sig.(2 tiled)	**0.49**					
Support	**Person correlation**	**.229**	**0.59**	**1**			
	Sig.(2 tiled)	**.005**	**.471**				
Access	**Person correlation**	**-.04**	**-.8**	**-.009**	**1**		
	Sig.(2 tiled)	**.642**	**.319**	**.915**			
Production	**Person correlation**	**-.333**	**.017**	**.087**	**-.081**	**1**	
	Sig.(2 tiled)		**.833**	**.278**	**.327**		
Income	**Person correlation**	**-.064**	**.001**	**-.074**	**-.062**	**.055**	**1**
	Sig.(2 tiled)	**.624**	**.990**	**.368**	**.450**	**.506**	

Note: - Correlation is significant at the 0.01level.Correlation is significant at the 0.05 of *p* Source:-Own scurvy 2018

4.2.8. Regression between Income of farmers and Influencing factors on Bamboo production

From the regression equation $R^2$is .12, indicating that 12 percent of the variation in bamboo production and income generation about its mean is explained by variations in access, attitude , support and skill about their respective means.

As shown in table 4.9 regression coefficients reveal that, skill of the farmers and attitude of the farmers, support stakeholders with lower level of bamboo production for income generation in small holder farmers. Therefore, improvements of skill, support, attitude of farmers towards bamboo production will increase contribution of bamboo production to income generation in the small holder farmers of Abrhamo and Abendemengida in Assosa woreda.

Table 4.11: The regressions equation of Bamboo contribution for income generation

Parameter Estimates					
Variable	**Parameter Estimate**	**Standard Error**	**beta**	**t-value**	***P* value**
Constant	15.42	1.460		10.646	.000
Access	-.061	.078	-.064	-.775	.440
Support	-.045	.061	-.063	-.742	.460
Attitude	.005	.051	.008	.096	.923
Skill	-.041	066	-.053	-.619	.537
N=150					

Source:-Own scurvy 2018

4.2.9. Hypothesis Testing

An examination of the structural model tests for the estimated coefficients (paths), which provide the basis for accepting or rejecting the proposed relationship between latent variables. The summary of path analysis for hypothesis testing was showed correlation table above. Based on it, the researcher constructed the summery of the hypothesis below.

$H_1$the attitude of farmers have appositive relation with the skill of the farmers and bamboo production to income generations for small holders farmers. It is based on the correlation the r =.161 with *p* value of 0.49.Therefore, this hypothesis is rejected as indicated in the table below.

$H_2$the support levels of stakeholders have a negative relation with access level of bamboo. So it becomes rejected. Because their value for the above listed variable is -.093 and p value is .087

H_3 the attitude of farmers, the skill of the farmers, the support level of stockholders, access level of bamboo have a negative relation with the production of bamboo and amount of income from bamboo production. This hypothesis is accepted as stated before reviewed the gathered and analyzed data.

Table 4.12: Hypothesis Testing

Hypothesis	**Accepting and rejecting level**
$H_1$the attitude of farmers have a negative relation with the skill of the farmers and bamboo production to income generations for small holders farmers	**Rejected**
$H_2$the support level of stakeholders have a positive relation with access level of bamboo	**Rejected**
H_3 the attitude of farmers, the skill of the farmers, the support level of stakeholders, access level of bamboo have a negative relation with the production of bamboo and amount of income from bamboo production.	**Accepted**

4.3. Summary

The sex composition, which is –128b are males and the rest 22 are females; while the marital status data depicted 27(18%) single, 105(70%) married, and 18 (12%) divorced . This Implies that many married persons formed a formidable working force in Assosa woreda. The education level revealed that few respondents were in secondary and at diploma level but many are illiterate, and some with a capacity of reading and writing.

About the support different stakeholders respondents respond for the raised questions. And it was discussed in chapter four in table 4.4. The first question was" did you get bamboo plantation and hand craft support from Asossa woreda to income generation?"And the response rate shows 50 (33%) disagree or they did not get any support, 55(36.7%) strongly disagree, 21(14%) become silent or become neutral to say anything about this question18 (14%) agreed and 6(4%) were strongly agreed. The second alternative question about support was did you get financial support? For this question from 150 returned question 45(30%) strongly disagreed, 95(63%) disagreed, 10(6.7%) become neutral. The third and the different stock holder related support question responded in the following manner 48(32%) strongly disagree, 42(28%) disagree, 30(20%) neutral and only 24(16%) and 6(4%) agree and strongly agree. The last and non-governmental related question the respondent's response was 49(32.7%) strongly disagree, 42(28%) disagree, 30(20%) neutral 21(14%), agreed and 5(3.3%) strongly agreed. From the elaborated above the researcher concluded the less access of the bamboo, the low support of the stack holders and low skill of the farmers are the problems to bamboo production income generation in Abrhamoo and Abendemengida kebeles. Above correlation matrix indicated in table 4.8, farmers attitude and their skill towards bamboo production to income generation is positively related r=0.61 and their *p value is 0.49.* This means when the attitude of the farmer increase their skill will increase to produce bamboo for income generation. The

relationship between the skill of the farmer and income generation form bamboo production is negatively related .And r= -.064an the p-value is.624. This indicated that, low skill of the farmers contributing low income of the farmer form bamboo production. Similarly support and income has negative relationship in this correlation matrix. r = -.074 and p=.368. This implies that, low supports of different stack holders resulting low income from bamboo production.

The study identified that Bamboo was one of the major income source on the life of representative household on the target kebeles especially because the access they have the nearby bamboo forest and the subsistence crop production and agriculture production/and also the contribution of the bamboo products for the household life were differentiate from household to household through their age composition, the skill and attitude of the household and the available productive household member within household and related key matters etc. To add, the sustainability of bamboo products in Assosa woreda were affected with many challenges .These were; the extreme exploitation the bamboo Culm time to time, lack of skill on management and harvesting of bamboo forest, un-expansion of manmade bamboo plantation in target area, uncontrolled wild fire and changing in the land use of bamboo to investment. on the other hand the lack of positive attitude in the society which lead the value of bamboo products low perception which compared to other timber products, lack of sufficient training on bamboo production and technique of the sustainable utilization of bamboo harvesting technique which include storage and handling , lack of proper market linkage which lead them to sell their bamboo with low-priced which attributed to the middle man role instead of the primary household, inadequate support from stakeholders. On the other hand, the target community well aware on using bamboo on traditional activity, like by selling bamboo Culm within their kebele as well at woreda town for different purpose (furniture machining, construction purpose and for the purpose traditional music instrument “Zumbara”, on the other hand I have seen special purpose of bamboo shoot “quntso” ; they use bamboo shoot as a food when the time rainy season as a subsidy for their family by collecting from bamboo forest which is a unique utilization of bamboo by this Berta Community in region as well in Ethiopia so based on my research

output my observation both sex engaged on bamboo shoot and bamboo culm collection for their family for food as well for income. Thus, implies the community attitude very positive and their life also depend on bamboo and bamboo product but until today they haven't have enough support through training, technology to upgrade the utilization and the contribution of bamboo for their income like other Asia countries; Furthermore, based on the major findings and conclusions; recommendations were made as it needs training, support on different up to date technologies, support from NGOs and Government for the household and strong institutional linkage with concerned bodies to improve the contribution of bamboo and bamboo products for the life of rural female and male household in the target area as well as sustain the economic benefit of bamboo resource all over the region.

CHAPTER FIVE

CONCULUSION AND RECOMANDATION

5.1. Conclusions

The study area is being a rural area, farm-based activities still constitute the main source of income for most people. But agricultural productivity of the area is low due to traditional agricultural practice and absence of mechanized farming system in the area. Livestock production of the area is also insignificant because of prevalence of disease specially tryponosomosis disease. So, smallholder farmer are dependent on natural vegetation found in the area. Non-farm incomes however, tote up a significant contribution to total family income. A majority of the population of this area is dependent on bamboo as energy source, construction and other HH material, grazing livestock and as main source of forestry-based income-generating sector by selling some products harvested from the natural bamboo forests. Though, the finding of the research reveal that the contribution of bamboo changes with differing wealth and proximity groups, being highest for the poor and near bamboo farmers. At the top end of the wealth spectrum, the wealthiest farmers are enjoying the bamboo resource for their own consumption, because they have other complementary or even alternative primary income-generating means-like from the farm and non-farm like mini trading. It seems that the poor lack the resources to benefit fully from the other potential resources found.

In the study area large bamboo resources however, the exact size of the resource is not known, except for the widely accepted 1997 estimate of Luso.

Further, too little is known about the rate at which bamboo resources are being harvested or utilized cleared to make way for agricultural or any other land use. There is growing pressure on bamboo forest resources to meet human and socioeconomic development needs in the area; mean that these forests are increasingly being utilized unsustainably. Totally, the rate of forest degradation in the area is high. Continued degradation of natural bamboo vegetations poses serious problems for a large number of local people, especially the poorer indigenous people who depend on these forests for most of their livelihoods. Still now, these resources have been seriously undervalued and much attention has instead been directed towards management of most tree species and their biodiversity. The present development policy problems and the difficulties in developing bamboo mean a problem of livelihood insecurity in general.

Although bamboo is not fundamental part of the economy of Ethiopia, it plays a very important role socially, economically and ecologically. Sound management and support for bamboo forests would ensure that poor people could continue using them for their livelihood needs - and especially as safety nets in response to shocks and pressures such as drought and climate change.

Afforded proper attention, bamboo forests can allow some families to lift themselves out of poverty. As a resource, they have enormous potential to fuel rural development and this has long been recognized in many parts of the world. Development programs can then be planned which utilize and develop the opportunities whilst circumventing, or even eliminating, the constraints.

Policies that give due attention to bamboo need to be available and should encourage the sustainable use of these products by communities. Promising

initiatives are being undertaken by government institutions, NGOs and the private sector. If all work in conjunction for a bigger impact, more economical benefit may be obtained from bamboo.

5.2. Recommendations

This section important to take action that have been seen from result and discussion which can may or may not answered the research questions from the specific objectives. So some recommendations for actions to help address its utilization of the bamboo resource and to increase its benefits for livelihoods development of the societies as well as ecology of the area can be made. Though these actions are highly interconnected, they are categorized below simply into four sections.

I) Documenting and advocating the levels of people's reliance on the bamboo resources of the study area

• The major contributions of bamboo resources to livelihoods of the poor, as fuel wood, construction & other HH material, human & animal food, means of income as well as its impact on other sectors, should be identified, quantified and promoted.

• The potential for cultivation of important bamboo food (shoots) should be explored, and their nutritional value enhanced – through post harvest treatment, storage, and preparation.

II) Adopting and promoting research based agroforestry practices or technologies

• Identifying traditional bamboo management practices that promote the resource base sustainability to capitalize on and promoting efficient utilization of bamboo energy and construction resources.

• In the study area, most of the people were found involved in agriculture as their main occupation. But the production is not sufficient. Their way of farming and cultivation is traditional and land degradation is vital problem. So

as the lowland bamboos is multipurpose plant and grow on poor sites, request for mechanisms of incorporating it to the local farm practice based on the outcome of research and demonstrations.

III) Improvement of policy, institutional/sectorial, economic and market support.

• Sectoral policies related to bamboo vegetations should be reviewed, including land, investment, processing and energy policies based on sound management principles, empowering local communities and stimulating markets and investments.

• Policy information, development initiatives and agreements should follow participatory, transparent and understandable approaches.

• Poverty surveys and economic policies should give attention to the contribution of bamboo to the livelihood of the rural community.

IV) Implementation of more sustainable forest management practices

• Practicing periodic up-to-date resource assessment tasks, using available technologies like remote sensing, continuously to have stock data and to capture trends of change over time.

• Devising strategies that help for decreasing/stagnating the human impact or pressure. In the study area the stallholders farmers can harvest bamboo from the natural vegetation. But this is can faces problem of degradation of bamboo, so it is important to establish bamboo nursery to increase afforastation of bamboo by human made.

• Appropriate sustainable forest management and community management approaches(with sharing of responsibilities, benefits and costs) should be implemented. Note that Sustainable management and improvement of the

contributions of bamboo vegetations will be a difficult and complex task, requiring an integrated and multi-sectoral approach with different yet complementary activities at multiple levels.

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Biographical Sketch

The author was born on March, 4, 1985 at East Showa, Matehara she attended her elementary education at Abadir, elementary and junior secondary school. She had also attended at Merti comprehensive secondary school from grade nine to twelve/preparatory/. She then joined in Mekelle-University with Bsc Degree in Natural Resource Economics and Management on July 16, 2006. After graduation she was employed by the Regional Agriculture and Rural Development Bureau and has been working for more than 4 years at Assosa in Benishangul Gumuz Regional state as Program Planning and Monitoring &Evaluation Expert.

With such experience I have been employed by CHF/Former Canadian Hunger Foundation/ with six Canadian Organization and with six different components under food security and economic growth project as being a project Manager at Sherkole woreda in Benishangul Gumuz Region for five years. Later joined Indra Gandi National Open University School of Continuing Education January, 2010 to pursue graduate studies for the advanced degree (MA) in Rural Development.

APPENDIX

i. Questionnaire for HH interviews

INDIRA GANDI NATIONAL Open University (IGNOU)

DEPARTMENT OF RURAL DEVELPEMENT

This questionnaire is design to gather data on the bamboo production and income generation of small holder farmers in Assosa woreda. Your response is strictly confidential and respondent's views in this questionnaire shall not be used for any other purpose rather than the advancement of this study. Therefore, your genuine responses contribute a lot to the accuracy of this research finding and to increase bamboo production and to generate high income for small holder farmers in Assosa woreda.

- ✓ This questionnaire has two parts. The first part is background information of farmers which includes personal details, years living in the kebeles and others. The second part involves questions related to factors related to bamboo production and income generation for small holder farmers in Assosa woreda.

General Instructions:

1. Please put (√) mark in appropriate places
2. Write in the spaces provided where appropriate

Kind Regards!!!

1. **To be filled with assistance of enumerator. / Enumerator name**

Part 1: Personal Information							
1.Household Personal Information/							
A. Household Composition							
No.	Position of family members living in the Household	Sex	Age	Marital Status	Education level		
1							
2							
3							
4							
5							
6							
7							
8							

B. Pattern of Labor				
No. (HH member)	Occupation	Other skills/ tradeis	Where do you work?	In which months? byT¾ý wR
1				
2				
3				
4				
5				
6				
7				
8				

2. Household Income (Response by HH head)			
Description	Estimates (ETB)		
	Dry Season	Rainy Season	Remark
Crop production			
Animal production			

Bamboo and Bamboo Products			
Forest products other than bamboo			
Employment			
Agriculture			
Trade/household enterprise			
Handicraft of products other than bamboo			
Rent of livestock (e.g. horses)			

Part Two: Bamboo production and income generation of smallholder farmers							
Please indicate your perceived level of agreement with the following statements Where; (5=Strongly Agree, 4=Agree, 3=Neutral, 2=Disagree, 1=Strongly Disagree)							
A. The attitude of farmers,							
No.	***Description***	**1**	**2**	**3**	**4**	**5**	Remark
1.	You have a good interest to use Bamboo for traditional activities						
2.	You believe that planting and cultivating bamboo tree is important for Income generation.						
3.	You are attracted by bamboo products in home						
4.	Bamboo is multi-dimensional important plant						

5	Bamboo alone can be the sources of income for farmers.						
5.	I use bamboo production for income generation.						
6.	Women have the biggest role in bamboo cutting, processing and selling to the market.						
4.1	If your answer for question 4(in the table) is agree in what form you use bamboo product? (Fill one or more)						
	a) I sell bamboo for firewood						
	b) I sell bamboo as a construction material						
	c) I sell bamboo in the form of handicraft products(household, cultural musical items)						
	d) I sell edible bamboo						

	shoot		
	E) I use bamboo shoot as a subsidiary food		
	f) I use bamboo for animal fodder		
4.2	Market you sell bamboo products and Distance from home in Km		
	Which market you sell bamboo products		
	Distance from home in Km		
4.3	Why do you sell bamboo products		
	a) Due to subsistence of farm products		
	b) when there are unexpected problems(disease		
	c) When there are holidays, wedding or other occasions.		

	d) When farm products fail (as copping mechanism)		
	e) other reasons,		
4.4	When do you sell bamboo Culm?		
	A) Daily		
	B) weekly		
	C) monthly		
	D) sometimes		
	E) I do not sell bamboo Culms at all		
4.5	How many bamboo culms do you sell at time?		
	A) 30-50		
	B) 50-100		
	C) above 100		
	D) above 500		
4.6	4.5. What is the price of one cum? (ETB)		
	A) kebele market		
	B) Assosa Market		

B. The Skill of the Farmers							
No.	Description	**1**	**2**	**3**	**4**	**5**	Remark
7	You have the skill for making handicraft to use bamboo for income generation						
8	I have no gap of knowledge producing bamboo for income						
9	Skill is important for bamboo producing for income						
10	I have skill training about income generation by using bamboo products						

C. The Support Level of the Stakeholders							
No.	***Description***	**1**	**2**	**3**	**4**	**5**	Remark
11	I get bamboo plantation and handicraft training supports of Assosa woreda about bamboo production for income generation						
12	I get financial supports to use bamboo production for income generation form different stake holders						
13	Different stakeholders give me moral supports/advice about bamboo production for income generations						

14	NGOs (non-governmental organizations) are supporting for small holders to producing bamboo as income sources						
15	I can manage bamboo producing by myself or indigenous knowledge.						
D. Access Level of Bamboo							
No.		**1**	**2**	**3**	**4**	**5**	Remark
16	I have the access to use bamboo products for income generation						
17	Bamboo scarcity is my problem to use products for income generation						

18	I can get plenty of bamboo from the natural forest nearby						
19	I have human made bamboo tree with a short distances						
20	Bamboo forest is monocarpic in our locality						
E. The production of bamboo							
No.	***Description***	**1**	**2**	**3**	**4**	**5**	Remark
1.	Low bamboo production is facing by different factors						
2.	I am getting high bamboo productions						
3.	High bamboo production in expected because of different factors.						

4.	Bamboo production varies from season to season						
F. Amounts of income generation from bamboo							
No.		**1**	**2**	**3**	**4**	**5**	Remark
1.	I am getting high income from bamboo production						
2.	I get low income from bamboo production						
3.	I didn't get any income from bamboo production						
4.	Bamboo production is not contributing for my income parts						
5.	Throughout my life I did not use bamboo production						
Please list factors affecting bamboo production for income generation in Assosa woreda							

2.7. If you have any additional valuable comments, please state here

ii. Major Lowland Bamboo Areas in Ethiopia

no	Bamboo Area	Region	Natural Stand /ha/	Plantation /ha/	Total Area/ha/
1	Hinde/North of Nekemte	Amhara	8670	-	8670
2	Assosa	Benishangul Gumuz	77947	-	77947
3	Bambasi	‘	64245	-	64245
4	Begi	‘	21509	-	21509
5	Nejo	Oromiya	27612	-	27612
6	Dibate	Benishangul Gumuz	14200	-	14200
7	Guba	‘	7757	-	7757
8	Kemash	‘	33830	-	33830
9	Pawe	‘	53830	-	53830
10	Gimbi	Oromiya	29125	-	29125
11	Guten	Oromiya	6044	-	6044
12	Metema /Dansha/Humera	Tigray/Amhara	425000	-	425000
13	Didessa	Oromiya	135000	-	135000
14	Dangur	Benishangul G’umuz	27350	-	27350
15	Bullen	‘	16780	-	16780
16	Galesa	‘	10870	-	10870
	Total		959662	-	959662

Adapted from Ensermu et al, 2000.

iii. MAP OF BAMBOO FOREST IN ETHIOPIA

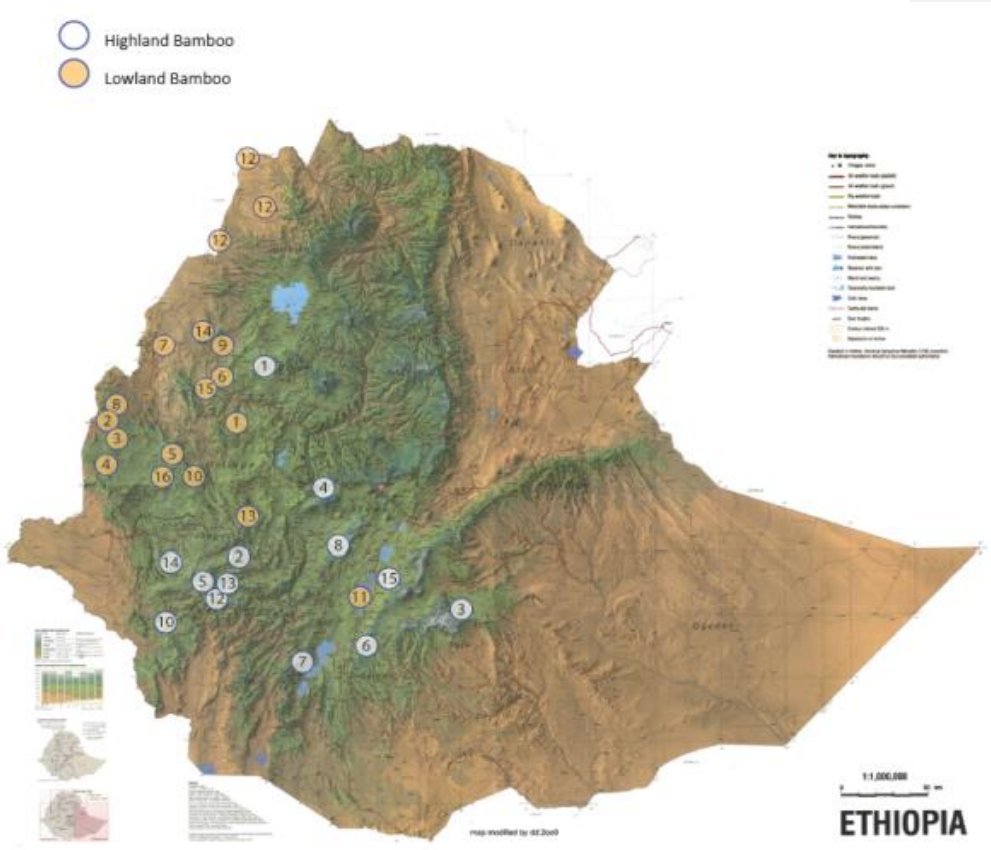

Fig 2.5 Distribution of Highland and lowland Bamboo

Bamboo Resource Document

Adapted from INBAR Training Manual 2016>from African Bamboo Recourse Document

PROFORMA FOR SUBMISION OF M.A.(RD)PROPOSAL FOR APPROVAL

Signature

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Approval/Not Approved

Date

Indra Gandhi National Open University School of Continuing Education

ASSESSING THE CONTRIBUTION OF BAMBOO PRODUCTS ON THE SMALLHOLDER FARMERS INCOME GENERATION: THE CASE OF ASSOSA WOREDA, BENISHANGUL GUMUZ REGIONAL STATE, ETHIOPIA.

BY

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A project Proposal

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1. INTRODUCTION

1.1. Background of the study

Bamboo is one of the world's most important non-timber forest products (NTFPs); which is classified at grass family over 1200 different species available worldwide; mainly found in tropical, sub-tropical and mild temperature zones of the world, the tropical belt having the maximum number of bamboo species. About 43 species of bamboo resources are found in Africa which covers a total of 1.4 million hector. Thus, Ethiopia's bamboo resources contribute 67% of the total bamboo in Africa (Xuhe, 2003). According to The International Network of Bamboo and Rattan (INBAR) estimate that over 2.2 billion people benefit from bamboo through income generation and non-market domestic uses including food and housing (Xuhe 2003). Estimates of world trade in bamboo approaches $7 billion annually and According to Zhaohua (2001), over 1500 distinct uses of bamboo have been recorded around the world. For example, bamboo floorboards, fabricated panels, handicrafts, curtains, modern ceilings, bio-energy, charcoal, paper, clothes, medicine, edible bamboo shoots, bamboo beer, bamboo soft drinks, etc. are important bamboo products in China (Bay 2004, Zhaohua 2001).

Ethiopia has two bamboo species namely lowland bamboo (*Oxythenanthera abyssinica* [A. Richard] Munro) and highland bamboo (*Yushania alpina* [K. Schumann] Lin). It is indicated that Ethiopia has over one million hectare bamboo resources and from which lowland bamboo covers about 85% (Embaye et al., 2005; INBAR, 2011). Benishangul Gumuz Regional State (BGRS) has huge lowland bamboo coverage that comprises about 48% of the total lowland bamboo resources of the country (Anonymous, 1997).

The focus of this research is to know the current level of bamboo and bamboo product contribution on the life of rural household in Assosa woreda Benishangul gumuz region. The interest to begin this research was to ensure that this baseline information was available. Documentation of local use and economic benefit from bamboo trade is necessary to understand the opportunities and constraints to bamboo harvesting, and how economically vulnerable these households were. Therefore, in this work, the researcher will identify the level of bamboo product production and utilization, income generation capacity for the rural

household in target area relatively with other Timber and non-timber forest products in Assosa woreda in Benishangul gumuz region.

1.2.Statement of the Problems

Bamboo has been traditionally perceived in Ethiopia as a plant negligible value in comparison to other forest products. However, many studies indicated that bamboo is a beautiful resistant, flexible, renewable and versatile material. African Humanitarian Action (AHA) (2010) mentioned that it is the wood of the future as it is the fastest growing grass with domestic, agricultural, environmental and industrial uses. Thus, it is an economic resource having enormous potential for improving the quality of life rural and urban Communities with environment regeneration qualities like carbon sequestering and provides raw material for large industries like paper and pulp as well as for cottage and handicraft industry. In relation to this, Conisbee M. and A. Simms (2003) stated that bamboo is fast growing multipurpose woody grass which has enormous potential for enhancing the environment, reducing poverty and generating sustainable economic growth through investment, industry and trade. Thus, the global market for bamboo product is approximate USD 7 billon which is expected to triple by the end of 2017 Fox, D. (2007).

With regard to the study area low land bamboo (oxythenathera Abyssinica) is a major species, rather dominant vegetation formation in the forest. Bamboo resource contribution and utilization is not advanced and limited as compared to the coverage's of bamboo resource in target area (Assosa woreda) which contribute underutilization of bamboo resource. Despite the fact that forestry research has been conducted in the country for the last 30 years, bamboo is still not considered as a research commodity: hence, there are no particular personnel and facilities assigned for it. Rather it was treated together with other forest tree species (Yigardu Mulatu and Mengistie Kinde 2010). More recently training centers on bamboo processing have been started(where). This action was collaborative effort of the Ministry of Agriculture and Rural development(MoARD) and Ministry of Trade and Industry(MoTI) of Ethiopia. It was at the beginning of Ethiopian Millennium (2007 and 2008) that bamboo was declared to be "the Millennium grass". Such initiatives are crucial. So, policies that bring such efforts into effect are important (Ibid). Thus this study will

investigate the extent of bamboo utilization as a means of income generation supporting the rural poor so as to display implications to take sounding action.

1.3. Important terms used in the project content

Bamboo: - Bamboo is a multipurpose plant with a myriad of applications ranging from construction materials, furniture, fences, handicrafts, pulp and paper, edible shoots, and animal fodder.

Low land bamboo: The lowland bamboo species is botanically known as Oxythenathera Abyssinica. It is a clump forming, solid stemmed bamboo that is widely distributed in the dry regions in the western part of Ethiopia.

Highland bamboo: The highland bamboo species is botanically known as Yushania alpina. This species grows naturally in ecological zones of the country between 2200 –3500 meters above sea level.

Bamboo products: - Materials which made from bamboo culms or different parts of bamboo plant

Small holder farmers: is based difference within the large population of households engaged in agricultural production on relatively small scale.

Contribution: Contribution refers to the act of contributing or the thing contributed (such as personal time, money, private property which contributed to lead the life small holder farmers)

Income: Income is the sum of all the wages, salaries, profits, interests payments, rents, and other forms of earnings received... in a given period of time.

Kebele: government/public administrative organ/body at a grass root level in Ethiopia

Woreda: government administrative organ/body subordinate to Zonal administration in Ethiopia

1.4. Objective of the Study

1.4.1. General objective

The general objective of the study is to investigate the role and importance of bamboo products for the small holder farmer income generation in the study area, Assosa woreda.

1.4.2. Specific Objectives

- To quantify the contribution of bamboo to household incomes in target village;
- To identify differences in household bamboo harvesting rates
- To assess entry barriers or assets required by households to produce bamboo products ; and
- To evaluate opportunities and constraints to sustainable bamboo production and products in Assosa woreda,

1.5. Research Questions

- What amount is the Bamboo production contribution to the smallholder's income generation in Assosa Woreda?
- In what rate is bamboo harvesting in Assosa Woreda?
- What are the obstacles for bamboo production in Assossa woreda?
- What opportunities are available to bamboo production and income generation in Assosa woreda?

1.6. Scope and Limitation of the Study

Thematically this study will be delimited to investigate the role of bamboo products for the small holder in the rural people community income generation in Benishangul Regional State, at Assosa woreda. Geographically this study also scoped in Assosa woreda. This is because that during the study, the researcher expects to face limitations such as scarcity of finance, lack of interest to fill the questioners at the required quality, consent, limitation of time are expected challenges to be occur. Consequently, a few questionnaires will be subject to reject before analysis due to the fact that to be filled improperly. Moreover, the researcher

will also face lack of enough collaboration from target community and local authority thus the fact that the and thus facing a challenge is expected. The study is also limited to household head respondents rather than including all actively engaged in the income generation

1.7 Significance of the Study

This study will be input for the concerned bodies to build up a structural support that processed bamboos Culm by using improved technology and skill which advance the utilization of bamboo and bamboo products for local community to improve their livelihood and increase the contribution of bamboo in advance for sustainable economic development. It may also encourage other researchers' further study and also serves as informative document on this area.

1.8 Expected Outcomes

- After the completion of the study the contribution of bamboo and bamboo products for small holder farmers' income generation will be assessed in Assosa Woreda and can indicate the recommendations.
- After the study farmers' perceptions on bamboo and bamboo products can be understand by different stakeholders in terms of production, processing, management and level of utilization will be assessed and documented.
- Policy makers and different non-governmental organizations (NGOs) can make initiatives, investments and programs that have a relevance to bamboo production and income effort to secure economic development of Assosa woreda farmers.
- Bamboo Products and potential of the bamboo resource and skill and practice of community on bamboo products in relation to improved technology will be identified.

2. Research Methodology

2.1. Description of the Study Area

Location

The Benishangul-Gumuz regional State is located in the western part of Ethiopia. The State shares common boundaries in the west with the North & South Sudan, in the north with the State of Amhara, in the east and south with the State of Oromia. The region have three zones; Assosa zone Kamashi zone and Metekel Zone and 21 woredas. Assosa woreda is one of the seven Woredas in Assosa zone. The woreda has 74 *Kebele* and according to *Central Statistical Authority (2012)* it has total population more than 133,757 of this Male is 68,052Females 65,705 (CSA, 2012).

Topography

The elevation of Benishangu Gumz region ranges from 580m to 2,731m above sea level. The highest peak is the Belaya plateau in Dangur district, the lowest where the Blue Nile crosses the Ethiopian Sudanese border. The major part of the region is about 75% is low lands (Kola, below 1500 m.a.s.l.). Twenty-four percent are mid lands (Woynadega, 500?-2,500m), and only 1% are high lands (Dega, above 2,500m).

2.2. Data Requirement

Data and information required for the purpose this study will be collected from both primary and secondary sources. The main sources of information for this study will be collected from primary data through the use of formally developed questionnaires for this study, interviews and field observation.

The sources of primary data will be the respondents in the sample kebeles in Assosa namely Abrhamoo and Abendem engda kebeles. As a source of secondary data different documents will be assessed to gather information that is relevant to the study and pertinent information on production and income generation of small holder farmers in the target areas, micro climate change records the history of the study area and other relevant information related to

the problems. The data and information from the Assosa district environmental protection office; Assosa district agricultural and rural development office and from the surrounding kebeles' administration offices will be collected and used for the study.

In addition to this, reports from non-governmental organizations (NGO) like UNHCR, IOMS, ARRA INBAR and the like will be collected. Other relevant offices documents those have the relation with the research objectives like previous research documents used as the secondary data to this research.

Information with regards to population and physical aspects of the study area will be collected from various documents published by the CSA, Ethiopian Mapping Authority (EMA) and Ethiopian Meteorological Services (EMS).

2.3. Sampling Procedure and Sample size

If the study includes majority of the Kebele Administrations (KAs) in Assosa woreda, it would have been more representative. The study is also limited to household head respondents rather than including all actively engaged in the income generation. Areas selected for the sample gathering purpose are Abrhamo and Abendem Engda kebeles as representing the rest kebeles in the woreda.

Determining the sample size of the study population by using a regular formula is very difficult due to the size of [large] household. Also taking into account limitation associated to finance, purpose of the study and homogenous nature (livelihood, culture, religion, language, bamboo production practice and the area they dwell) of the householders, the researcher has limited the sample size in to 154 householder.

As to use percentage, this sample size seems to be low, but due to the factors stated above the planed sample can represent the population to conduct the research. The sampling technique employed was systematic sampling method. The sample was taken systematically from the list of households in their administration arrangement.

2.4. Method of Data Analysis

After collecting the required data, the researcher will use the software called Statistical Package for the Social Sciences (SPSS) of version 20 and 22 for the purpose of processing and analysis of the data for preparing of results. Descriptive and inferential analysis will be used to interpret the data.

Descriptive statistics will be applied to describe data by frequency, percentile and graphic distribution for the responses of discussion including the respondents. Inferential statics such as correlation and regressions will be done to identify the association and relationship between dependent and independent variables.

Variable Specification and Hypothesis

2.4.1. Variable Specification

Based on the literature and research journals, the following variables are used for this study:

Independent Variables

The independent variables are the factors that can be varied or manipulated in an experiment. The independent variables are variables that will have hypothesized to influence the dependent variable. The independent variables in this study are the attitude of farmers, the skill of the farmers, the support level of stakeholders, accesses level of bamboo.

Dependent Variables

The dependent variable is the variable that is simply measured by the researcher. It is the variable that reflects the influence of the independent variable. In this study, dependent variables are the production of bamboo and amount of income from bamboo production.

2.4.2. Hypothesis

H_1 the attitude of farmers have a negative relation with the skill of the farmers and bamboo production to income generations for small holders farmers.

H_2 the support level of stakeholders have a positive relation with access level of bamboo

H_3 the attitude of farmers, the skill of the farmers, the support level of stockholders, access level of bamboo have a negative relation with the production of bamboo and amount of income from bamboo production.

3. Work Plan Time table by Months year 2018

No	**Activities**	**Duration**												**Remark**
		Year,9/01/2017-4/01/2018												
		Months												
		S	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	
1	Topic selection	x												
2	Searching literature Review	x	x	x	x	X								
4	Normal proposal presentation						x							
5	First draft questionnaire presentation						x							
6	Field observation				x			x						
7	Conducting interview							x						
9	Data collection													
10	Data analysis							x						
11	Data interpretation							x	x					
12	First data report writing							x	x					
13	Normal report writing								x	x				
14	Presentation/defense													
15	Contact with advisor	x	x	x	x	X	x	x	x	x				

4. Budget Schedule and Logistics

Budget Breakdown

Table2:- Description of budget needed to the research activity

NO	Description	Unit	Quantity	Unit price	Total Price/birr
1	Computer paper	pack	6	9	2000
2	Photocopy paper	pack	7	8	2200
3	Pen(black, blue, red)	pack	20	5	600
4	Flash memory	8GB	1	350	600
5	Notebook	PCS	4	25	500
6	RW-CD	PCS	4	25	100
7	Photo copy material	LS	-	-	800
8	Internet	-	-	-	2000
9	Total	-	-	-	8800

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INBAR"s N.D. Bamboo and Rattan Development Programs Kenya Forestry Research Institute Nairobi.

APENDIX :- DSIGNED QUESTIONER

INDIRA GANDI NATIONAL OPEN UNIVERSITY (IGNOU)

DEPARTEMENT OF RURAL DEVELPEMENT

This questionnaire is design to gather data on the bamboo production and income generation of small holder farmers in Assosa woreda. Your response is strictly confidential and respondent's views in this questionnaire shall not be used for any other purpose rather than the advancement of this study. Therefore, your genuine responses contribute a lot to the accuracy of this research finding and to increase bamboo production and to generate high income for small holder farmers in Assosa woreda.

- ✓ This questionnaire has two parts. The first part is background information of farmers which includes personal details, years living in the kebeles and others. The second part involves questions related to factors related to bamboo production and income generation for small holder farmers in Assosa woreda.

General Instructions:

3. Please put (√) mark in appropriate places
4. Write in the spaces provided where appropriate

Kind Regards!!!

2. To be filled with assistance of enumerator. / Enumerator name

Part 1: Personal Information							
1.Household Personal Information							
A. Household Composition							
No.	Position of family members living in the Household	Sex	Age	Marital Status	Education level		
1							
2							
3							
4							
5							
6							
7							
8							

B. Pattern of Labor				
No. (HH member)	Occupation	Other skills/ trades	Where do you work?	In which months?
1				
2				
3				
4				
5				
6				
7				
8				

2. Household Income (Response by HH head)			
Description	Estimates (ETB)		
	Dry Season	Rainy Season	Remark
Crop production			
Animal production			
Bamboo and Bamboo Products			
Forest products other than bamboo			
Employment			
Agriculture			
Trade/household enterprise			
Handicraft of products other than bamboo			
Rent of livestock (e.g. horses)			

Part Two: Bamboo production and income generation of smallholder farmers							
Please indicate your perceived level of agreement with the following statements Where; (5=Strongly Agree, 4=Agree, 3=Neutral, 2=Disagree, 1=Strongly Disagree)							
A. The attitude of farmers,							
No.	***Description***	**1**	**2**	**3**	**4**	**5**	Remark
1.	You have a good interest to use Bamboo for traditional activities						
2.	You believe that planting and cultivating bamboo tree is important for Income generation.						
3.	You are attracted by bamboo products in home						
4.	Bamboo is multi-dimensional important plant						
5	Bamboo alone can be the sources of income for farmers.						
5.	I use bamboo production for income generation.						
6.	Women have the biggest role in bamboo cutting, processing and selling to the market.						

4.1	If your answer for question 4(in the table) is agree in what form you use bamboo product? (Fill one or more)		
	a) I sell bamboo for firewood		
	b) I sell bamboo as a construction material		
	c) I sell bamboo in the form of handicraft products(household, cultural musical items)		
	d) I sell edible bamboo shoot		
	E) I use bamboo shoot as a subsidiary food		
	f) I use bamboo for animal fodder		
4.2	Market you sell bamboo products and Distance from home in Km		
	Which market you sell bamboo products		
	Distance from home in Km		
4.3	Why do you sell bamboo products		
	a) Due to subsistence of farm products		
	b) when there are unexpected problems(disease		
	c) When there are holidays, wedding or other occasions.		

	d) When farm products fail (as copping mechanism)		
	e) other reasons,		
4.4	When do you sell bamboo Culm?		
	A) Daily		
	B) weekly		
	C) monthly		
	D) sometimes		
	E) I do not sell bamboo Culms at all		
4.5	How many bamboo culms do you sell at time?		
	A) 30-50		
	B) 50-100		
	C) above 100		
	D) above 500		
4.6	4.5. What is the price of one cum? (ETB)		
	A) kebele market		
	B) Assosa Market		

B. The Skill of the Farmers							
No.	Description	**1**	**2**	**3**	**4**	**5**	Remark
7	You have the skill for making handicraft to use bamboo for income generation						
8	I have no gap of knowledge producing bamboo for income						
9	Skill is important for bamboo producing for income						
10	I have skill training about income generation by using bamboo products						
C. The Support Level of the Stakeholders							
No.	***Description***	**1**	**2**	**3**	**4**	**5**	Remark
11	I get bamboo plantation and handicraft training supports of Assosa woreda about bamboo production for income generation						
12	I get financial supports to use bamboo production for income generation form different stake holders						

13	Different stakeholders give me moral supports/advice about bamboo production for income generations						
14	NGOs (non-governmental organizations) are supporting for small holders to producing bamboo as income sources						
15	I can manage bamboo producing by myself or indigenous knowledge.						
D. Access Level of Bamboo							
No.		**1**	**2**	**3**	**4**	**5**	Remark
16	I have the access to use bamboo products for income generation						
17	Bamboo scarcity is my problem to use products for income generation						
18	I can get plenty of bamboo from the natural forest nearby						
19	I have human made bamboo tree with a short distances						

20	Bamboo forest is monocarpic in our locality						
E. The production of bamboo							
No.	***Description***	**1**	**2**	**3**	**4**	**5**	Remark
1.	Low bamboo production is facing by different factors						
2.	I am getting high bamboo productions						
3.	High bamboo production in expected because of different factors.						
4.	Bamboo production varies from season to season						
F. Amounts of income generation from bamboo							
No.		**1**	**2**	**3**	**4**	**5**	Remark
1.	I am getting high income from bamboo production						
2.	I get low income from bamboo production						
3.	I didn't get any income from bamboo production						

4.	Bamboo production is not contributing for my income parts						
5.	Throughout my life I did not use bamboo production						

Please list factors affecting bamboo production for income generation in Assossa woreda

2.7. If you have any additional valuable comments, please state here

Thank you for cooperating

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Qualifications/degree a. Doctor of Philosophy (PhD) : Production Ecology and Resource es Conservation, Wageningen University, the Netherlands

b. Master of science in Horticulture, Alemaya University of Agriculture, Ethiopia

Horticulture production, processing and protection technology Trainings (diploma, Participatory Rural appraisal (PRA) Training (FARM AFRICA-certificate) Ethiopia),

International potato course: production, storage and seed technology, the Netherlands,

Recent development in potato technology for rural development in sub-Saharan Africa,

Employment

- Educator, Researcher and consulting, at Hawassa University, St Mary's University and Unity University

Academic advisor

- Advised over two hundred graduate program students in crop production, horticulture, ecology, food security, irrigation, land use and water resource

Research Project

- Studies on agronomy and crop physiology of *Plectranths edulis* (Vatke) Agnew
- Studies on the growing and utilization of cassava plant, and its anti-nutritional factor: cyanide,

leading

Research on yam at Awassa college of Agriculture

Research coordinator of Ground nut program of the Dryland Coordination Group (Norwegian group) and Hawasa University

Publications:

Consulted several national and international institutions/organizations in several subjects, which some of them are:

At ILRI and African RISE: an assessment on highland fruit crops and vegetable production under the title: Understanding production and marketing constraints of vegetables and fruit crops across the value chain in the Ethiopian highlands: case study at Sinana, Mahoney and Debreberhan. Supervisor Dr Tilahun Amede ICRISAT-Principal Scientist and Country Representatives, Tel :251-911230135, (in the year 2014)

CIP and USAID project: Evaluating the potato and sweet potato programs in north and south Ethiopia with HEDBEZ Business and Consultancy PLC. Project title: Tackling food insecurity and malnutrition through diversification: exploiting the potential of potato and sweet potato to reduce food insecurity and dependence on cereal in SNNPR and Tigray (in the year 2014).

With SOS/SAHEL/Ethiopia- Establishing peeper value chain project in south region particularly in Gurage area. An action research program financed by smallholder livelihood Improvement project (SLIP of SOS/SAHEL).

With SOS/SAHEL/Ethiopia- Establishing an extension manual on pepper production and processing. Financed by smallholder livelihood Improvement project (SLIP of SOS/SAHEL).

With Dryland Coordination Group (DCG- Norway): Consulting a project entitled : Contributing to wealth creation and food safety to farmers by reducing yield loss and mycotoxin contaminations of ground nut in selected drylands of Ethiopia".

With Dryland Coordination Group (DCG- Norway): reviewing, and compiling a report entitled "Impact of Resettlement on the Livelihood, Food Security and Natural Resource Utilization in

Ethiopia" Engaged in several out-reach and community services, which include: Several communities in Sidama/Hawassa, Woliyta on the production and protection of root and tuber crops: potato, Plectranthus *edulis,* enset, cassava, yam, Several farming communities on the production of groundnut in Eastern and Southern Ethiopia with the Dryland Coordination Group/ Norwegian Church Aid Several farming communities on the value Chain of pepper with SOS/Sahel at Hawassa/Sidama, and Gurage zone/Butagera, On the production of apple and olive crops at Debreberhan

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