

# Value added and Profitability analysis of bamboo products in case of Banja district Awi zone Amhara regional state Ethiopia

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## Research

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# Abstract

## Background

Bamboo meets a rising and diverse consumer demands and generates income and contribute to reforestation and climate change mitigation due to its rapid growth and environmentally friendly character. Most bamboo processing enterprises and farmer and consumers use manual technology and produce less durable products. Since there is no research conducted in the area related to profitability of different bamboo products and the distribution of value added Therefore, this study aims to analyse the profitability of bamboo products for producers, traders and processors in the same way it analyses the value added distribution among different agents.

## Methods

To collect primary data 122 smallholder bamboo producers, 13 traders and 16 bamboo product processors were selected. To analyse the data descriptive statistics were employed.

## Results

On average producers supply 374.79 bamboo culms and earn revenue of 7,623.23 ETB. The total value added at the producer level was 15.64 ETB per culm. On average local traders, retailers and wholesalers earn 7.52%, 9.51% and 9.23% of profit Margin and these traders earn average revenue of 66,420 ETB, 129,360ETB and 280,343 ETB respectively. Traditional bamboo product processors produce 687 traditional bamboo chairs on average per year and gained 3.06 ETB/culm as a net profit. Bamboo furniture enterprises on average process 823 modern bamboo chair per year and they earn 197.91 ETB per chair as a net profit. Higher value is added at bamboo furniture enterprise level and lower value is added at producer and trader level.

## Conclusion

The result of the study revealed that all actors have positive profit and value is added by different chain actors and distributed to different agents. Bamboo furniture enterprises gained higher profit margin than traditional bamboo processors. The contribution of the bamboo sector to the government economy is limited. Based on the finding of the study, an effort should be made to increase the contribution of the sector to the national economy. In addition to this, providing working capital and working place and enhancing the processors' skill and capacity to transform the business into more modern and profitable bamboo furniture enterprise is advisable.

## Background

Bamboo is one of the most important vegetation resources in highlands of Ethiopia with diverse local and national importance in terms of filling subsistence needs and cash income (Godfrey, 2014). Bamboo meets a rising and diverse consumer demands and generates income and contribute to reforestation and climate change mitigation due to its rapid growth and environmentally friendly character (Pabuayon, 2009; Lobovikov et al, 2011). *Yushania alpina* is found in different parts of Ethiopia. It covers a large area between Bale Mountain, Bonga and Metu in South West part of Ethiopia and up to Dangla in the North. It covers 20% of Ethiopia's total bamboo area (Getachew and Wubalem, 2014).

The markets for bamboo are not well developed (Zenebe, 2014). The majority of output is used for subsistence while only a third of the estimated production is delivered for the market and there is weak linkage among intermediaries and trade is highly restricted to local and national markets (Endalamaw and Pretzsch, 2012).

In Awi zone and the Amhara National Regional State, bamboo is an integral part of the day to day life of many households and it is source of income for many farmers and urban inhabitants engaged in off-farm activities (BoA, 2012). Banja is one of the district in Awi zone which has suitable agro ecology to produce different crops and plants. The district is endowed by highland bamboo resource and it is the main source of income. Most bamboo processing enterprises and farmer and consumers use manual technology and produce less durable products (Endalamaw et al, 2013). Since there is no research conducted in the area related to profitability of different bamboo products and the distribution of value added in the form of profit (producers, traders and processors), remuneration (labour) and government revenue (tax and levies). Therefore, this study aims to analyse the profitability of bamboo products for producers, traders and processors in the same way it analyses the value added distribution among different agents.

## Research Methodology

### Description of the study area

This study was conducted in Banja District Awi Zone Amhara regional State, Ethiopia. It is bordered on the south by Ankesha, on the West by Guangua, on the North by Fagita Lekoma and in the East by the West Gojjam zone. The district is composed of 26 kebeles out of this 25 are rural kebeles and one urban kebele. Out of the 25 rural kebele 20 kebeles produce the highland bamboo. Injibara town is the capital of Banja district. It is located about 442 kms North West to Addis Ababa and 116 kms south of Bahir Dar (BWADO, 2006). Banja district was selected as an entry point due to bamboo resource production, distribution, processing and marketing of bamboo and its products and based on its significance contribution to the community specifically and the country in general.

Total population of the district was estimated at 121,511. Out of this 60,354 (49.67%) were male and 61,157 (50.33%) were female (CSA, 2007). The total area coverage of the district is 47915.82 ha. The current land use pattern includes 12,277 ha cultivated land, 21,141.57 ha grazing/pasture land, 14,188.87 ha covered by forest from which 65.65% covered by plantation forest and the remaining area covered by

natural forest. Mixed farming system is practiced in the area with rain fed crop production and animal raring being the main source of livelihoods (BWADO, 2006).

## Sampling Technique and Sample Size Determination

Two stage sampling technique was used to draw the sample. In the first stage, with the consultation of agricultural and development agents of the district, bamboo producer kebeles were identified and four producer kebele were selected randomly from 20 bamboo producer kebeles. The sampled kebele include Kessa Chewusa, Gashena Akayta, ledeta and Surta.

In the second stage, from each sampled kebele bamboo producer farmers were listed out with the help of development agents at kebele level. From these population lists, 122sample farmers were selected randomly based on probability proportional sampling to size (Table 1).

The sample size is determined by using Yamane (1967) formula. In the district 6690 farmers produce highland bamboo and in the sampled kebele 1449 farmers produce highland Bamboo.

$$n = \frac{N}{1+N(e)^2} \quad (1)$$

Where, N is population of the district bamboo producer

n is the sample size

e is the level of precision which is 9%

$$n = \frac{N}{1+N(e)^2} = \frac{6690}{1+6690(0.09)^2} = 122 \text{ HHS}$$

Name of kebele	Number of producer	Proportion	Sample size	Sampling intensity
Kessa Chewusa	492	0.34	42	8.5
Gashena Akayta	350	0.24	29	8.29
Ledeta	325	0.22	27	8.31
Surta	282	0.2	24	8.51
Total	1449	1	122	8.42

Thirteen Traders (3 wholesalers, 5 retailers and 5 local traders) were selected by using snowball sampling. Six processors (1 furniture enterprise and 5 traditional product processors) from Kessa were selected purposively because processors are located at Kessa and Injibara town in the road side and in Injibara town there are two licensed bamboo processing enterprises, one is in the form of cooperative

enterprise and the other one is private owned enterprise. Therefore, due to small number of these enterprises both of them were included in the sample. In addition to the licensed enterprises, there are a number of unlicensed traditional bamboo processors at Injibara town in the road side. Therefore, by using purposive sampling eight bamboo processors were selected. Totally, 16 bamboo processors (3 furniture enterprisers and 13 traditional bamboo processors) were selected purposively.

## **Data type, Sources and Method of Data Collection**

Quantitative and qualitative data were collected from primary and secondary data source to deal with objectives. Primary were collected through semi-structured interview schedule by using open ended and close ended questions, field observation. Secondary data were collected from Local level trade offices', office of agriculture, annual reports, published and unpublished documents and internet sources were reviewed to support the primary data.

### **Method of data analysis**

Descriptive statistics includes mean, percentage; frequency and standard deviation were used in the process of examining socio-economic and demographic characteristics of sampled respondents, profitability, value added and its distribution among different agents.

## **Results And Discussion**

### **Demographic and socio economic characteristics of highland bamboo traders**

Highland bamboo trade is male dominated business that all of the traders are male headed. It indicates that in bamboo trading activity the participation of women is very limited due to different barriers like working culture of the community. The education level of the trader varies from the informal education to completion of secondary school. The proportion of education level is as follows; 7.7% of the trader cannot read and write, 61.5% of the traders can read and write without attending formal education, 15.4% attend primary school and 15.4% of the sampled traders have attended high school education. Bamboo traders have a mean experience of 10.08 with a standard deviation of 5.074 years. In the study area wholesalers, retailers and local collectors were involved. There are different barrier of entry to bamboo trading activity such as issues related to trade license and existence of unlicensed bamboo traders in the area. The livelihood of traders depends on the farming activity and trading of bamboo and related products (Table 2).

Table 2: Demographic and socio economic characteristics of sampled traders

<b>Categorical variables</b>	<b>Item</b>	<b>Frequency</b>	<b>Percent</b>	
Sex	Male	13	100	
	Female	0	0	
Marital status	Married	13	100	
Education status	Cannot read and write	1	7.7	
	Can read and write	8	61.5	
	Attend primary school	2	15.4	
	Attend secondary school	2	15.4	
<b>Continuous variables</b>	<b>Min</b>	<b>max</b>	<b>Mean</b>	<b>SD</b>
Experience	4	20	10.08	5.074

Source: Field survey result, 2020

## Demographic and socio economic characteristics of bamboo processors

As shown in the table below all of the bamboo processors were male headed and 15.4% of the processor were married. It indicates that in the bamboo processing mostly the young people especially the students were involved in this activity. In the study area some females participate on the production of bamboo mat near to the main road of the city. The education level result showed that 46% of the processors have attended secondary school and 30.8% of the processors have attended the primary school education. This indicates that the bamboo processing activity is a good source of job opportunity and it needs educated people. The sampled bamboo processors have a mean working experience of 6.62 years with a variation of 3.84 year among them. Bamboo processing is used as a means of livelihood for bamboo processors.

Table 3: Demographic and socio economic characteristics of bamboo processor

<b>Categorical variable</b>	<b>Item</b>	<b>Frequency</b>	<b>Percent</b>	
Sex	Male	13	100	
Marital status	Single	11	84.6	
	Married	2	15.4	
Education status	Can read and write	1	7.7	
	Attend primary school	4	30.8	
	Attend secondary school	6	46.2	
	Attend higher education	2	15.4	
<b>Continuous variable</b>	<b>Min</b>	<b>max</b>	<b>Mean</b>	<b>SD</b>
Experience	2	15	6.62	3.841

Source: Field survey result, 2020

## Profitability analysis of bamboo products

### Profitability analysis of bamboo culm at producers level

Bamboo producers have used family labour and own land for bamboo production. Therefore, in the profitability analysis the opportunity cost of labour and rent for own land were considered and the market price to purchase inputs were used. On average producers allocate 0.15 ha of land for bamboo plantation and the average number of bamboo culm supplied by producer was 374.97 bamboo culm.

The average production cost per bamboo culm is 8.41 ETB. Bamboo producers did not incur monetary cost rather opportunity cost of family labour and rent for land were considered. These constitute 31.98% rent for land and 46.24% opportunity costs of labour. On average producers supply 374.79 bamboo culms and earn revenue of 7,623.23 ETB. By deducting all the production and marketing costs from the total revenue producers earn 4475.71 ETB which makes 58.71% of profit margin (Table 4). Tefera *et al.* (2013) found that producers earn 90.89% of profit margin. The present study indicates that the profit of producers become decrease through time. The total value added at the producer level was 15.64 ETB per culm. It is the summation of profit, remuneration (labour) and government revenue but at the producer level bamboo producers did not pay tax for the government.

Table 4: Bamboo producer costs, profit margin and value added

Cost items	Birr per 374.97 culm/ 0.15 ha	Cost per culm(ETB)	Production cost (%)
Site preparation	290.37	0.77	9.47
Planting labor	201.13	0.54	6.64
Weeding cost	114.81	0.31	3.81
Fencing material cost	194.75	0.52	6.4
Fencing labor cost	213.61	0.57	7.01
Culm cutting cost	294.98	0.79	9.72
Culm harvesting cost	291.6	0.78	9.59
Rent for land	973.81	2.6	31.98
Material cost	100	0.27	
Total production cost(A)	2675.06	7.15	84.62
Marketing cost(B)			15.38
Transportation cost	472.46	1.26	
Overall cost (A+B)=C	3147.52	8.41	100
Average selling price per culm	20.34		
Total revenue ( p*Q)=D	7623.23	20.34	
Net return/profit (D-C)	4479.37	11.93	
Profit margin	58.73%		
Value added	5885.87	15.69	

Source: Field survey result, 2020

## Profitability analysis of bamboo culm at traders' level

On average local traders, retailers and wholesalers earn 7.52%, 9.51% and 9.23% of profit

Margin and these traders earn average revenue of 66,420 ETB, 129,360ETB and 280,343 ETB respectively. These low profit margins discourage the traders to engage in bamboo trading business. From these traders, wholesalers incur the highest marketing cost since these traders purchase large number of bamboo culm than other traders. The value added at local trader, retail level and wholesale level was 2.81 ETB, 4.84 ETB and 3.77ETB respectively (Table 5). Tefera *et al.* (2013) reported that traders earn 32.78% of the profit margin

Table 5: Profitability analysis of bamboo culm traders

	Local traders		Retailers		Wholesalers	
	Total	Birr/Culm	Total	Birr/culm	Total	Birr/culm
Cost items and price						
Average Culm handled	2460		4200		9667	
purchasing price	55,104	22.4	103,320	24.6	225,531	23.33
Transportation cost	3260	1.33	4000	0.95	14000	1.45
Telephone cost	1120	0.46	1730	0.41	4333.33	0.45
Loading and unloading	1940	0.79	4675	1.11	9866.67	1.02
Tax	0.00	0.00	2880	0.69	4000	0.41
Levy	0.00	0.00	460	0.12	766.67	0.08
Total marketing costs	6320	2.58	13745	3.28	32966.67	3.41
Total cost	61424	24.98	117065	27.88	254497.67	26.74
Average selling price	-	27	-	30.8	-	29
Gross revenue	66420		129360		280343	
Net profit	4996	2.02	12295	2.92	25845.33	2.26
Profit margin (%)	7.52		9.51		9.23	
Value added	6936	2.81	20,310	4.84	40478.67	3.77

Source: Field survey result, 2020

## Profitability analysis of bamboo processors

Traditional bamboo product processors produce 687 traditional bamboo chairs on average per year. To produce a single three setter bamboo chair on average two bamboo culm is required. The cost of processing constitutes 64.42% purchasing price for bamboo culm, 34.7% opportunity cost for labor, 0.62% cost for drill and cost for brush constitutes 0.26% of the total production cost. Annually bamboo processors earn 4,211.31ETB by selling 687 three setter bamboo chair. As indicated in Table 6 processors gained 3.06 ETB per culm as a net profit .It indicates that the profit is not balanced with the processing activity. In the study area all of the traditional bamboo chair producers produce the bamboo products manually. It needs attention to transform these processors into better business work. Solomon *et al.* (2016) indicated that bamboo processors gained 10.95 ETB per culm. The author stated that the cost benefit analyses in the existing market chain processors were highly beneficial. But in this study it did not encourage the processor to engage in bamboo processing business.

Table 6: Profitability analysis of bamboo processors

Cost item	Cost(ETB)/chair	Cost/culm	Percent
Purchasing price	47.84	23.93	64.42
Labor cost (opportunity cost)	25.77	12.89	34.70
Drill cost	0.46	0.23	0.62
Brush	0.19	0.095	0.26
Total processing cost (A)	74.26	37.15	100
Selling price(B)	80.39	40.2	
Gross revenue(p*Q)	55227.97	-	
Profit (B-A)	6.13	3.06	
Profit margin (%)	7.62%	7.62%	
Value added	31.9	15.95	

Source: Field survey data, 2020

## Profitability analysis of bamboo furniture enterprises

Bamboo furniture enterprises on average process 823 modern bamboo chair per year. All bamboo furniture enterprises used on average two bamboo culm to make a single modern bamboo chair. Bamboo furniture enterprises earn highest annual income than other actors. These enterprises produce better value added products than the traditional bamboo product producers. On average the bamboo furniture enterprises earn 197.91 ETB per chair. The cost for culm and labour cost constitutes 26.25% and 20.67% of the total processing cost. The profitability analysis at bamboo furniture enterprise level indicates that the enterprises gained 197.91ETB per chair .It indicates that investing on modern bamboo processing business leads to better business profit. Dafroza (2016) reported that processors received 46% of the profit margin.

Table 7: Costs, profit margin and value added at bamboo furniture enterprise level

Cost item	Cost (ETB)/chair	Cost per culm percent	
Culm purchasing price	48.67	24.34	26.25
Electricity and house rent	7.48	3.74	4.03
Labor cost	38.33	19.17	20.67
Tax	3.77	1.89	2.03
Varnish	29.5	14.75	15.91
Glue	10.67	5.34	5.76
Nail	24	12	12.94
Cost for coloring	23	11.5	12.4
Total cost(A)	185.42	92.71	100
Selling price(B)	383.33	191.67	
Gross revenue (p*Q)	315,480.59	-	
Profit(B-A)	197.91	98.96	
Profit margin (%)	51.63	51.63%	
Value added	240.01	120.01	

Source: Field survey data, 2020

## Demographic and socio economic characteristics of highland bamboo traders

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<b>Continuous variable</b>	<b>Min</b>	<b>max</b>	<b>Mean</b>	<b>SD</b>
Experience	2	15	6.62	3.841

Source: Field survey result, 2020

### **Profitability analysis of bamboo products**

#### **Profitability analysis of bamboo culm at producers level**

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Marketing cost(B)			15.38
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Value added	5885.87	15.69	

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Drill cost	0.46	0.23	0.62
Brush	0.19	0.095	0.26
Total processing cost (A)	74.26	37.15	100
Selling price(B)	80.39	40.2	
Gross revenue(p*Q)	55227.97	-	
Profit (B-A)	6.13	3.06	
Profit margin (%)	7.62%	7.62%	
Value added	31.9	15.95	

Source: Field survey data, 2020

## Profitability analysis of bamboo furniture enterprises

Bamboo furniture enterprises on average process 823 modern bamboo chair per year. All bamboo furniture enterprises used on average two bamboo culm to make a single modern bamboo chair. Bamboo furniture enterprises earn highest annual income than other actors. These enterprises produce better value added products than the traditional bamboo product producers. On average the bamboo furniture enterprises earn 197.91 ETB per chair. The cost for culm and labour cost constitutes 26.25% and 20.67% of the total processing cost. The profitability analysis at bamboo furniture enterprise level indicates that the enterprises gained 197.91ETB per chair .It indicates that investing on modern bamboo processing business leads to better business profit. Dafroza (2016) reported that processors received 46% of the profit margin.

Table 7: Costs, profit margin and value added at bamboo furniture enterprise level

Cost item	Cost (ETB)/chair	Cost per culm percent	
Culm purchasing price	48.67	24.34	26.25
Electricity and house rent	7.48	3.74	4.03
Labor cost	38.33	19.17	20.67
Tax	3.77	1.89	2.03
Varnish	29.5	14.75	15.91
Glue	10.67	5.34	5.76
Nail	24	12	12.94
Cost for coloring	23	11.5	12.4
Total cost(A)	185.42	92.71	100
Selling price(B)	383.33	191.67	
Gross revenue (p*Q)	315,480.59	-	
Profit(B-A)	197.91	98.96	
Profit margin (%)	51.63	51.63%	
Value added	240.01	120.01	

Source: Field survey data, 2020

## Value Added and its Appropriation

Value added can be distribute into the different node of the value chain as net profit, personal remuneration and taxes (Vedeld *et al.*,2004). Value added is not only an element of income for the enterprises but also it includes the value added distribution along the fundamental agents of the national economy: households(recipients of the return to labour, financial institutions (interest charges), government adminstration(taxes) and enterprises(gross or net profit).

The total value added in the bamboo product was estimated about 163.02 ETB per a single bamboo culm. It was distributed along the agents .About 9.59% of the total value added was shared by bamboo producers. loca traders,retailers and wholesalers account 1.72%,2.97% and 2.31% of the total value added respectively. Traditional bamboo product processors and bamboo furniture enterprises account 9.78% and 73.62% of the total value added. It indicates that bamboo furniture enterprises share the highest portion of the total value added.

Table 8: Value added at different stages

<b>Value added stage</b>	<b>ETB per culm</b>	<b>Percent</b>
Producers	15.64	9.59
Local traders	2.81	1.72
Retailers	4.84	2.97
Wholesalers	3.77	2.31
Bamboo processor	15.95	9.78
Bamboo furniture enterprises	120.01	73.62
<b>Total</b>	<b>163.02</b>	<b>100</b>

Source: extracted from the above table

The total value added is appropriated to different agents as personal remuneration for labour, profit for the enterprises and taxes and levies for government administration. Majority of the total value added (74.84 %) is appropriated as net profit for producers, traders and processors and the remaining 23.76% and 1.96% of the total value added was accounted for labour in the form of remuneration and government administration in the form of taxes and levies respectively. It indicates that the income generation and employment creation at different stages and the rise of government in bamboo value chain (Figure 1)

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## Conclusions And Recommendations

The result of the study revealed that all actors have positive profit and value is added by different chain actors and distributed to different agents. The total production cost is 3147.52 ETB. On average producers supply 374.79 bamboo culms and earn revenue of 7,623.23 ETB. By deducting all the production and marketing costs from the total revenue producers earn 4475.71 ETB which makes 58.71% of profit margin. On average local traders, retailers and wholesalers earn 7.52%, 9.51% and 9.23% of profit Margin and these traders earn average revenue of 66,420 ETB, 129,360ETB and 280,343 ETB respectively. These low profit margins discourage the traders to engage in bamboo trading business. Bamboo furniture enterprises gained higher profit margin (51.63%) than traditional bamboo processors (7.62%).

Majority (74.84 %) of the total value added was appropriated as net profit for producers, traders and processors and the remaining 23.76% and 1.96% of the total value added was accounted for labour in the form of remuneration and government administration in the form of revenue as taxes and levies respectively. it indicates that the contribution of the bamboo sector to the government economy is limited. It indicates that the share of government administration from the total value added of bamboo products is limited. Therefore, an effort should be made to increase the contribution of the sector to the national economy. The trade and industry office should encourage the bamboo traders by giving its own license and other support services. The government and small scale and micro enterprises office should support

both traditional bamboo product processors and furniture enterprises by providing working capital and working place and enhance the processors' skill and capacity to transform the business into more modern and profitable bamboo furniture enterprise.

## **Abbreviations**

BoA: Bureau of Agriculture, BWADO: Banja Woreda Agricultural and Development Office, CSA: Central Statistical Agency

## **Declarations**

### **Consent for publication**

Not applicable

### **Authors' contribution**

All authors read and approved the final manuscript

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### **Competing interests**

The authors declare that they have no competing interests

### **Funding**

The authors received no direct funding for this study

### **Availability of data and materials**

The data used to support the finding of this study are available from the corresponding author upon reasonable request.

### **Ethical approval and consent for participate**

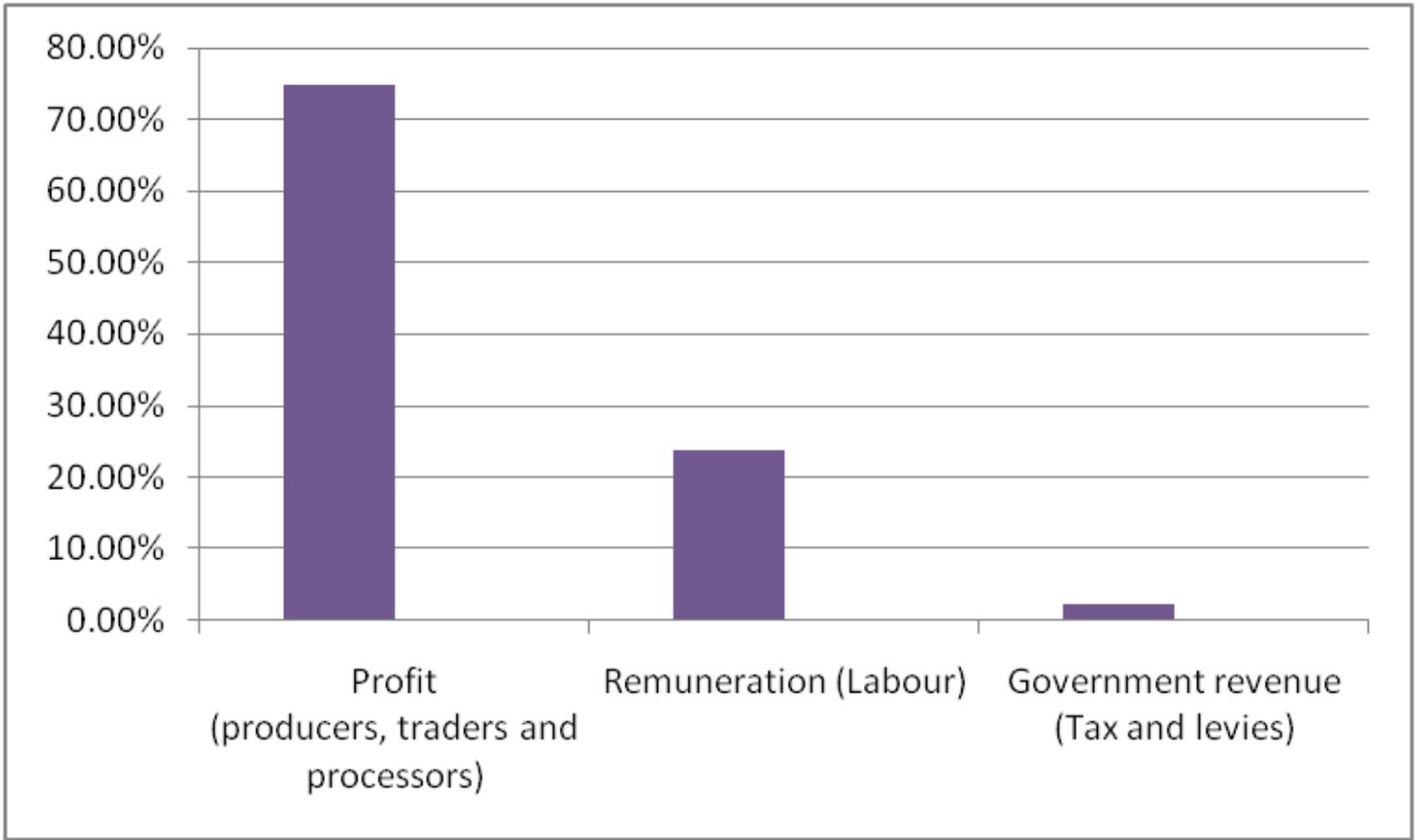
Ethical clearance letters were collected Debre Markos University research and community directorate and Awi zone administrative office to care for the study participants and the researchers. During survey official letters were written for the district and each kebele informed verbal consent was obtained from each client, and confidentially was maintained by giving codes for each respondent. All participants

throughout the research including households and enumerators were fully informed about the objectives of the study.

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## Figures



**Figure 1**

Value added distribution along different agents