

Bamboo Supply Chain in Dalisodo Village Malang Regency

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Abstract

The use of bamboo is growing as raw material for various industrial purposes so categorized as the main support of the village community economy. This study aims to analyze: 1) mechanism of bamboo supply chain of bamboo, 2) value added of bamboo supply chain actors, 3) factors that influence the income of stick business. The population were bamboo farmers and stick entrepreneurs in Dalisodo Village respectively 83 and 78 person. Samples were determined using simple random sampling method of 36 bamboo farmers and 35 stick entrepreneurs. Data collected were analyzed descriptively quantitatively for bamboo farm and stick business income, and multiple linear regression to analyze the determinants of stick business income. The results show that the bamboo business income is IDR 343,450 per 900 kg of wet bamboo while the added value obtained by stick businessmen is IDR 962,400 per 300 kg. Age, business experience, raw materials and labor had a significant effect on stick business income.

Keywords: Bamboo, stick, supply chain, income.

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Introduction

Indonesia is a large bamboo producer (*Bambusa vulgaris* Schrad). Natural bamboo forests will only produce 4 tons per year per hectare, while in bamboo plantations the average annual yield reaches 20-36 tons per hectare. Bamboo is a wealth of non-timber forest as part of Indonesia's forest resources. It can be one of the wood substitutions in the increasingly limited forest presence.

In the villages, the use of bamboo is seen in the presence of household appliances such as tables and chairs, beds, walls, and others (Lopez and Stanley, 2010; Sukawi, 2010). However, at present, it is growing as a raw material for various industries, then bamboo is categorized as main support of the rural economy. Bamboo farming is easy to do because the planting is done once. It will multiply by itself and grow easily in suitable habitats and then harvested according to need. This situation indicates a great opportunity for bamboo businesses. Growth of bamboo plants depends on the growing environment, adequate cropping patterns and maintenance techniques.

Bamboo has very important benefits for life. All parts of the plant starting from roots, stems, leaves, petals, and even bamboo shoots can be utilized (Berlian and Rahayu, 1995; Suhasman and Bakri, 2012). According to the Ministry of Trade (2011), 88 of the 1250 types of bamboo in the world, are endemic species of the archipelago. Bamboo which has economic value is betung, carrion, yellow, spotted, black. Betung bamboo used for water channel, water tap, walls, and various types of handicrafts. Andong bamboo is used for handicrafts, building materials, and for chopsticks. Yellow bamboo is used for furniture, paper making materials, handicrafts, ornamental plants, as well as for yellow or lever disease. Spotted bamboo is used for furniture, walls, floors of houses, and handicrafts. Black bamboo is suitable for manufacture of musical instruments, furniture and handicraft materials.

In fact, bamboo has a lot of benefits, but it has not been prioritized in development and it seen as "the property of the poor that is quickly damaged". It needs to be attention to development of bamboo plantations and bamboo handicraft businesses, as well as promotion of bamboo products. The main problem of increasing bamboo industry in Indonesia is lack of raw materials and competition of the use for bamboo raw materials. Procurement of raw materials for large industries and future use must be done by building a bamboo plantation. Building a bamboo industry should start from the availability of raw materials, processing into various products to meet the needs of the community, and its distribution to final consumer. It is relevant to the concept of supply chain and value chain. Integration of various parties into system needs to be assessed empirically as it relates to competitiveness. According to Wu (2008), integration of elements in supply chain requires both internal and external socialization processes. According to Agus (2015), in recent competitive market, producing value-added, high quality and innovative products have emerged as the most vital strategy for manufacturing companies to survive. SCM has become an integral part of corporate strategy and its adoption in manufacturing companies has steadily accelerated since the 1980s. Simon et al. (2015) stated that the success of a single business primarily depends on its ability to integrate its network of business relationships.

In Dalisodo Village, there are quite a number of bamboo farmers and businessmen of processed bamboo products (stick) which are used as one of the supporting ingredients for making incense for religious ceremonies, and other bamboo processed products. As part of bamboo supply chain system, if bamboo and stick business in this village are developed, it will be able to increase community and village economy. Therefore, it is necessary to identify costs and income of bamboo farming and stick business in order to find out the added value produced by bamboo stick businessman. Furthermore, it is also necessary to examine what factors determine entrepreneur income. Based on these problems, an empirical study of supply chains and value chains of bamboo commodities is needed in Dalisodo Village, Malang Regency.

Research Method

This research was conducted in Village of Dalisodo, Wagir Subdistrict, Malang Regency. This village is the business center of export quality incense sticks. Incense of stick is one of superior product of Malang Regency and mainstay business for Dalisodo Village society. Stick is made from bamboo and an incense craftsman can produce 2.5 tons per week.

The population is all bamboo farmers and stick entrepreneurs in Dalisodo Village. Records of the village office showed that there were 83 bamboo farmers and 78 stick entrepreneurs in this village. Sample is determined by simple random sampling method, in which bamboo farmer sample was 36 people and stick entrepreneur sample was 35 people.

Data were collected directly from respondents using survey method, interview and questionnaire. It were analyzed descriptively quantitatively, while factors affecting business income were analyzed by multiple linear regression. The multiple linear regression equation model used:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4$$

Where Y = income, a = constant, b_i = regression coefficient, X1 = business experience, X2 = age, X3 = raw material cost and X4 = labor cost.

Analysis steps with multiple linear regression were explained below.

Determination coefficient (R^2) shows ability of independent variable to explain variation of dependent variable. This parameter shows goodness of fit model.

F test is used to prove whether all independent variables (business experience, age, raw material costs and labor costs) had a simultaneous effect on dependent variable (business income). If probability of significance is <0.05 , then independent variables have a significant effect on business income.

t test was used to examine effect of business experience, age, cost of raw materials and labor costs on partial business income. If probability of significance is <0.05 , then

partially the business experience, age, raw material costs and labor costs have a significant effect on business income

Results and Discussions

Characteristics of Bamboo Farmers and Stick Entrepreneurs

Bamboo farmers in Dalisodo Village are more than 50 years old, had elementary school education, experience in bamboo farming for 1-2 years and bamboo land area of 2 ha. It seems that the people in this village are responding to increasing opportunities for bamboo needs. According to some farmers, bamboo plants in this region were reduced due to increasing incense demand, so bamboo were imported from outside Dalisodo Village. The fact shows a scarcity of bamboo as a raw material for sticks. Stick is used as one of raw materials in incense business.

Table 1. Characteristics of Bamboo Farmers and Stick Entrepreneurs

Bamboo Farmers			Stick Entrepreneurs		
Category	Quantity (person)	Percentage (%)	Category	Quantity (person)	Percentage (%)
Age (year)			Age (year)		
29 - 39	6	16,7	19 - 39	19	54,3
40 - 50	12	33,3	40 - 50	13	37,0
> 50	18	50,0	> 50	3	8,7
Education			Education		
SD	36	100	SD	34	97,1
			SMP	1	2,9
Experience (year)			Experience (year)		
1 - 2	30	83,2	1 - 3	26	74,3
2,5 - 3	4	11,2	4 - 5	8	22,8
> 3	2	5,6	> 5	1	2,9
Land area (ha)					
1	13	36,1			
2	20	55,6			
3	3	8,3			

Source: Primary data, 2018

Stick entrepreneurs were included in category of young age, namely 19-39 years old, only elementary school level education, and have business experience making sticks for 1-3 years. It explains relationship between existence of bamboo farmers and stick entrepreneurs. Women can be involved in this business because of the importance of gender roles in development of small businesses (Pudjiastuti, 2015). Moreover, characteristics of respondent are presented in Table 1.

Bamboo Supply Chain in Dalisodo Village

After being cut by bamboo farmers, bamboo sent to stick entrepreneur. Bamboo is cut into some pieces according to the length of stick required by incense entrepreneur, and then sharpened using a machine. Stick in a length and diameter size as requested, sent to incense entrepreneur. There were stick entrepreneur who also act as incense entrepreneurs. Bamboo farmers provide smallest added value in bamboo supply chain. Bamboo supply chain in Dalisodo Village presented in Figure 1. Future research will be developed to illustrate all of the economic actors in this supply chain so that it can serve as the basis for evaluation of the guidance policy for the institution involved in.

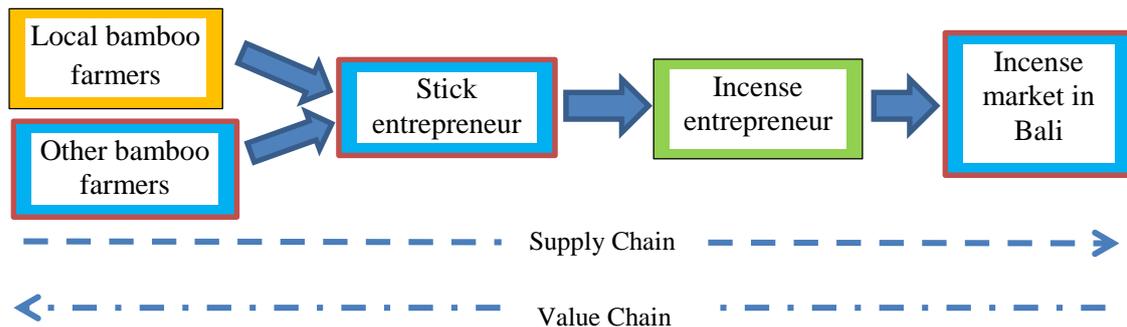


Figure 1. Bamboo Supply Chain in Dalisodo Village

Table 2. Institutional Assistance to the Stick and Incense Enterprises in Dalisodo Village

No	Institution	Type of donation	Quantity	Value (million IDR)
1	PT Pertamina	shaving machine (2017)	1 unit	26
		incense machine (2015)	1 unit	27.5
		polishing machine (2014)	1 unit	15
2	Watershed Management Institute and Sampean Brantas Protection Forest	shaving machine (2014)	1 unit	26
		Bamboo seeds (2015)	4000 stem	28
3	Forestry Service of Malang Regency	Bamboo seeds (2014)	4000 stem	28
4	Directorate General of Social Forestry and Environmental Partnership of Ministry of Environment and Forestry	shaving machine (2014)	2 unit	54
5	Bank Rakyat Indonesia	Capital (People's Business Credit) with a loan period of 2 years and interest of 0.6% / month	Per person	25

Source: Primary data, 2018

Therefore coaching to farmers and entrepreneurs is an important element in the supply chain. The guidance given to entrepreneurs from various agencies is intended to encourage the increase of local revenues and one village one product (OVOP) program by local government. Bali is a market for all the incense produced in this region, and the demand has not been fulfilled. This is a business opportunity for Dalisodo Village people

to improve their welfare from bamboo farm and stick business. Assistance provided by several government institutions can be seen in Table 2.

Cost and Revenue of Bamboo Farming and Stick Business

Income of bamboo farming and stick business is a consideration for use of production factors during last month in two businesses. Revenue is a difference between revenue and total cost (Anindita et al, 2011) and multiplication of total production and price, while total cost is sum of fixed costs and variable costs. Costs and revenues of bamboo farming and stick businesses are presented in Table 3.

Table 3. Cost and Revenue of Bamboo Farming and Stick Business

No	Bamboo farming per 900 kg		Stick business per 300 kg	
	Description	Value (IDR)	Description	Value (IDR)
1	Fixed Cost		Fixed Cost	
	Depreciation: Chopping knife	2.300	Depreciation: Shaving machine	5.500
	Saw	4.250	Saw	4.250
			Long knife	1.500
			Ax	2.500
2	Variable Cost		Variable Cost	
	Wages	150.000	Wages	450.000
			Bamboo	500.000
	Total Cost	56.550	Total Cost	963.750
3	Revenue	500.000	Revenue	1.350.000
4	Profit	343.450	Profit	962.400

Source: Primary data, 2018

Equipment used in bamboo farming was very simple and not expensive i.e. machetes and saws. Depreciation is calculated based on equipment purchase price and economic life assumed for 2 years with no residual value. The results show that profit obtained by bamboo farmers was IDR 343,450 per 900 kg wet bamboo. Equipment used by stick entrepreneurs consists of sharpening machines, saws, long knives and axes. Fixed costs per 300 kg stick, can be said is relatively small i.e. IDR 13,750. Net income or profit of stick businessmen is IDR 962,400.

Costs and revenues of both businesses are clearly different. Actually, bamboo farmers not only sell bamboo in the form of logs, but provide added value in advance by transforming bamboo logs into stick to increase their income. This fact also shows that added value of sticks business is higher than bamboo farmers. However, this business opportunity has not been maximally utilized by Dalisodo Village people because they prefer to sell bamboo logs rather than processing it into stick. The importance of developing a bamboo supply chain is the same as that proposed by Wei (2012), bamboo industry is facing good opportunities for development in China, but it faces enormous challenges. Brack et al. (2016) stated that the ability of governments and corporations to

reduce or end this link between agriculture and deforestation depends on the nature of the international supply chains, the uses of the commodities, the consumers and producers involved, and likely future developments. Endalamaw et al. (2013), also stated that bamboo is an abundant resource in Ethiopia and has a great potential for commercialization, which can drive rural development.

Influence of Age, Business Experience, Raw Materials and Labor to Stick Business Income

The model can be developed for future research by adding variables that contribute to stick business income because the determination coefficient was only 0.555. However, F test results (Table 4) shows that age of entrepreneur, business experience, raw materials, and labor, simultaneously had significant effect on stick business income. Partially, only raw material factors had significant effect. Meanwhile, variable of age, business experience, and labor, had no significant effect. It shows the dependency of stick business operations on bamboo business. The results of multiple linear regression model analysis were presented in Table 4.

Table 4. Influence Factors on Stick Business Income

Model	Unstandardized Coefficients		t	Sig.
	B	Std. Error		
(Constant)	-4656562.491	9083927.640	-.513	0.612
Age (X ₁)	38875.346	223497.832	174	0.863
Business experience (X ₂)	-375257.711	1232444.802	-0.304	0.763
Raw material (X ₃)	2.192	,900	2.436	0.021
Labor (X ₄)	-0.241	1.580	-0.152	0.880
R ² : 0,555 F Statistik : 5,571 Sig. F : 0,058 Dependen Variable: Income (Y)				

Source: Primary data, 2017

Based on the analysis, multiple linear regression model can be formulated as follows:

$$Y = - 4656562 + 38875X_1 - 375258 X_2 + 2.192 X_3 - 241 X_4$$

a. Age of entrepreneur

Regression coefficient of entrepreneur age is 38.875. It shows that age has a positive influence on income, meaning that the higher age, income of businessmen will increase. However, the result of regression analysis (t test) shows that age had no significant effect to income of businessmen. These findings indicate that business actors of all ages can enter the business market.

b. Business Experience

Regression coefficient of business experience variable is -375.258. The coefficient is negatively marked means that the longer business experience, income of entrepreneurs will decrease. It is an indication that increasing business experience, entrepreneurs get references to various products made from bamboo that can be produced and have a higher economic value than stick. As a result, entrepreneurs turn to other more profitable product businesses. Another alternative is that the entrepreneur diverts some of his capital to diversify product. However, the result of regression analysis (t test) shows that business experience had no significant effect to stick businessman's income. So, sticks business do not require business experience.

c. Raw Material

Regression coefficient of raw material variable is 2,192. It means that every addition of bamboo raw materials worth IDR 10,000, will increase revenue by IDR 21,920. Significant effect of raw materials on business income indicates the importance of bamboo, especially as its availability is increasingly scarce. Continuous production of sticks in order to meet the demand of incense entrepreneurs has led to difficulty of fulfilling raw materials of bamboo. To maintain continuity business of incense and stick, the entrepreneurs must bought bamboo from outside the village. It is an opportunity for bamboo farmers in Dalisodo Village to maintain continuity of bamboo business. Some research results indicate that intensive bamboo cultivation will increase production and productivity of bamboo plants.

d. Labor

Regression coefficient of labor cost is -0.224. Negative coefficient means that every additional 10 laborers, the income will decrease by IDR 2.41. It also provides a signal for business owners to reduce the use of labor. However, the result of t test analysis stated that the amount of labor employed had no significant effect so that it can be ignored.

In India, the limiting factors for farmers wanting to maximize their farm-inputs, services and technology, lack of information about government resources, institutions and extension services (Mudda et al., 2017). Agribusiness sector's complex value chain spans input companies, farmers, traders, food companies and retailers, all of whom must satisfy the varying demands of the consumer in a sustainable manner (Stirling, 2013; Heyzer and Reinder, 2014). If bamboo is developed intensively by farmers and incense entrepreneur can be exported, then bamboo supply chain will contribute to Indonesia's trade balance as an advantage of international trade (Pudjiastuti, 2014).

Conclusion

Based on the results and discussions that have been described, the following conclusions can be deduced: 1) supply chain of bamboo in Dalisodo Village is the integration of bamboo supply activity from bamboo farmers to stick businesses which will be used as additional material by incense business, 2) value added in bamboo farmers, measured by bamboo business income is relatively very small that is IDR 213,500/month. The added value by business entrepreneurs was IDR 6.118.500/ month. 3) age, business experience, raw materials and labor have significant effect simultaneously to business

income. Raw materials has a significant and positive effect on income, whereas age, business experience and labor have no significant effect.

Suggestions can be given: 1) bamboo farmers can increase their income by entering the business market because the business opportunity is still wide open, 2) In addition to minimizing transportation, the sales of bamboo farmer's produce in the form of partnership with big-scale businessmen will guarantee the marketing of the stick produced by bamboo farmers, 3) Entrepreneurs in Dalisodo Village will be able to maintain their business if raw materials are available, scarcity of bamboo in this village is a business opportunity for the community. Building supply chain with bamboo farmer as raw material owner, will guarantee continuity of stick production so that it can be competitive.

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