

# Bengkuang Agricultural Business Analysis

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**Abstract**—This study aims to determine the factors that affect the production or income of farmers' bengkuang in Padang city. This research was conducted in Padang City, population and sample of this research is farmer of bengkuang. The sample size is 39 farmers. Data collection techniques with documentation and questionnaires. The variables studied are the experience on planting bengkuang, the use of technology, working hours, land area and the number of bengkuang production. Data analysis techniques are used descriptive analysis and production function analysis by using Eviews. The result of this research are: (1) the derived products of bengkuang are worth to do because number of production is enough to fulfill requirement of derived production process, land area and working hours of farmer still possible to be added. The working hours of merchant trades are very high, but there is no product innovation. (2) The technology which is used by farmers does not have a significant effect on increasing bengkuang production. While experience on planting bengkuang, length of work, and the land area have a significant effect on the production of bengkuang. Land area gives the biggest influence to the production of bengkuang in Padang city of West Sumatra.

**Keywords**—*bengkuang business; experience on planting bengkuang; length of work; and the land area*

## I. INTRODUCTION

Based on observations is known that the traders of bengkuang only get a profit between Rp. 30,000 to Rp. 50,000 per day. The low profit gained because the very low value added of the products which is sold. The merchants buy the bags from the collectors and sell them on beside the road every day. This means that they do not do any processing to increase the value added. Traders only tie it up and stack it on the side of the road. Besides that, the storage is very simple, they only store the bengkuang in sacks. This will affect to the quality of bengkuang itself. Bengkuang has a kind of fruit with high water content. High water content in Bengkuang causes the shorter of its shelf life, which is about 6 days if it is not handled properly. Quality changes during post-harvest occur in various stages, starting from production, post-harvest handling, marketing, distribution and processing. These changes of quality include the change in the number and quality of tubers, ranging from physical damage, rodent attacks (mice), fungal and bacterial diseases, psychological processes such as germination, dehydration, and respiration. Weight loss during storage time in a warehouse or other storage place that can reach 10-12% in the first 3 months and 30-60% after 6 months [1]. To maintain the quality and shelf life of bengkuang, then

post-harvest processing is needed. There are various technologies that can be applied to post-processing of bengkuang, one of them is making bengkuang flour. Bengkuang in the form of flour can be stored longer, practical and the volume is smaller. Through this method, it is able to increase the economic value of bengkuang by 15 to 20 times of selling price. Besides that, the consumers who bought bengkuang also very limited. It is only the passengers of public transportation who pass the road. This condition occurs because the presence of Bengkuang as a gift is very limited.

From the description above, it can be concluded that bengkuang is a product that has been known for a long time by the people in Padang City and used as a souvenir for tourists visiting Padang. The development of bengkuang at least having an impact on the farmers as the producers of these premium products, then traders as intermediaries and tourists as the final buyers. This means that the development of bengkuang products will be able to increase farmers' income because increasing in demand will increase the selling price as well. Likewise, traders will increase their sales with the development of the bengkuang. Finally, tourists will also get a nutritious and attractive souvenir.

Based on research that has been conducted by various experts, bengkuang can be used as various types of products and has vitamins which are very useful for humans. Bengkoang has a composition that varies according to the type of cultivar and maturity of the plant part. In the form of tubers ready for harvesting, bengkoang contains 80-90% water, 10-17% carbohydrates, 1 - 2.5% protein, 0.5-1% fiber, 0.1 - 0.2% fat and vitamin C. The young fruit contains 86% water, 10% carbohydrates, 2.6% protein, 0.9% fiber, 0.3% fat and vitamin C. In the form of mature seeds, containing 30% oil/fat, pachyrrizon, acids pachyrrizon, 0.5-1% rotenon and 0.5-1% rotenoid. In part of the bengkuang's leaves contain less than 0.01% rotenone and rotenoid, but in the tubers do not have this compound [2]. Based on information obtained from the Indonesian Directorate of Nutrition [3], the nutritional composition of bengkuang's tuber (levels per 100 grams) consists of energy of 55 kcal, 1.4 g protein, 0.2 g fat, 12.8 g of carbohydrate, 15 mg calcium, 18 mg phosphorus, 0.6 mg Zink, 20 mg of vitamin C, 0.04 mg of vitamin B1, 0.5 UI vitamin A and 85.1 g of water.

Bengkoang's pulp is rich in dietary fiber and has the potential as a prebiotic source, because it is thought contain of inulin and other oligosaccharides. Bengkoang tuber contains

inulin which cannot be digested, so it can be used as a sugar substitute, can be processed as preserved food or sweets [4]. According Kundu, *Pachyrhizus erosus* was used in the manufacture of high-quality flour in India [5]. In addition, bengkuang can be processed into chips, stew food and soup. Bengkuang contains of sugar and starch and contains enough vitamin C. In addition, it also contains lots of fiber, calcium, iron, niacin, and riboflavin.

**II. METHOD**

This research was conducted in Padang City, population and sample of this research is farmer of bengkuang. Samples are purposively drawn because the number of bengkuang farmers is not known clearly. The sample size is 39 farmers. The data collected in the form of secondary and primary data. Data collection techniques with documentation and questionnaires. The variables studied are the experience on planting bengkuang, the use of technology, working hours, land area and the number of bengkuang production. Data analysis techniques are used descriptive analysis and production function analysis by using Eviews.

**III. RESULT AND DISCUSSION**

**A. Research Results**

The result of data analyzed can be seen in the table 1 below:

TABLE I. RESULT OF DATA ANALYZED

Dependent Variable: LOG (Y)  
 Method: Least Squares  
 Date: 11/27/17 Time: 20:11  
 Sample: 1 39  
 Included observations: 39

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.137328	1.008835	0.136126	0.8925
LOG(X1)	0.147510	0.054002	2.731579	0.0098
LOG(X2)	0.420759	0.169081	2.488498	0.0177
LOG(X3)	0.511393	0.140495	3.639927	0.0009
<b>R-squared</b>	0.834673	Mean dependent var		3.395389
<b>Adjusted R-squared</b>	0.820502	S.D. dependent var		0.504343
<b>S.E. of regression</b>	0.213676	Akaike info criterion		-0.151799
<b>Sum squared reside</b>	1.598007	Schwarz criterion		0.018822
<b>Log likelihood</b>	6.960086	Hannan-Quinn criter.		-0.090582
<b>F-statistic</b>	58.90054	Durbin-Watson stat		1.439871
<b>Prob (F-statistic)</b>	0.000000			

Based on the results of the analysis of data of bengkuang farmers as follows:

$$\text{Log } Y = 0.1373 + \log 0.1475 X_1 + \log 0.4207 X_2 + \log 0.5113 X_3 + e$$

Information:

Y = Production of bengkuang (1 x harvest / sack)

X1 = Farmer experience (years)

X2 = Working hours

X3 = Land area (Ha)

From the results of the research in the equation above, estimates can be made as follows:

**1) Estimation of analysis result equation:**

- The magnitude of the constant is 0.1373, it shows the proxy of technology. With the magnitude of these coefficients, the technology has a positive and significant influence on the bengkuang production in Padang City. The better use of technology, the more production of bengkuang.
- The coefficient of bengkuang farmers' experience variables is 0.1475. The direction of the coefficient is positive, thus indicating that the more experienced the bengkuang farmers, the higher production of bengkuang by the farmer, assuming the other variables are ceteris paribus.
- The coefficient of variable working hours is 0.4207. This means that there is a positive direction between the working hours of farmers and the bengkuang production by the farmers. This means that an increase in working hours will increase the production of bengkuang in Padang city, assuming other variables are ceteris paribus.
- The magnitude for variable land area coefficient is 0.5113. Thus the direction coefficient is positive, so that it can be estimated if the area of cultivated land increases by 1 ha, then the production will increase by 0.5113 sacks, assuming the other variables are ceteris paribus.

**B. Hypothesis Test**

Based on the results of the analysis that has been carried out on the hypothesis formulated in Chapter II above, the hypothesis is tested. Hypothesis testing is carried out by using the t test (t-test).

**1) First hypothesis:** The first hypothesis is the experience of bengkuang farmer has a significant influence on the number of bengkuang production in Padang City. Based on the results of the study it is known that the probability is 0.0098, smaller than the Alpha of 0.05. Therefore the alternative hypothesis is accepted. Means that the experience of bengkuang farming affects the amount of bengkuang production in Padang city.

**2) Second hypothesis:** The second hypothesis is working hours have a significant effect on bengkuang production in Padang City. Based on the results of the analysis, it is known that the probability magnitude is 0.0177. This is smaller than alpha 0.05. Thus the alternative hypothesis is accepted. Therefore, working hours have a positive and significant influence on the production of bengkuang in Padang City.

**3) Third hypothesis:** The third hypothesis is that land area has a significant effect on bengkuang production in Padang City. From the results of the analysis of the data obtained the probability of 0.0009. This is smaller than alpha 0.05, thus Ha submitted is accepted. Therefore: The area of cultivated land farmers has a significant effect on the amount of bengkuang production Padang City.

#### IV. DISCUSSION

##### A. Influence of Farmer Cultivation Experience on the Amount of Bengkuang Production

Bengkuang (*Pachyrhizus erosus*) is one type of plant that has many benefits in various industrial fields, health, beauty, and food. Bengkuang can be processed into various products. One of them is bengkuang juice for easy consumption and as the source of vitamin C, polyphenols and flavonoids, all of which function as antioxidants. Polyphenols and flavonoids have an effect on reducing the risk of heart and blood vessel disease [6]. In one study, it was found that the bengkuang juice (*Pachyrhizus erosus*) had an effect on decreasing blood cholesterol levels in white rats (*Rattus Norvegicus*) [7]. Bengkuang fruit (*Pachyrhizus erosus*) contains vitamin C as much as 91.76 mg/100 g.

Based on the results of the study, it was found that Experience had a significant effect on the production bengkuang by farmers in Padang City. The coefficient produced also has a positive direction. This means that the more experienced the farmer is, the more production increases to certain conditions and vice versa. The experience of farmers becomes learning for them, meaning that the more experienced they are, the more quality of their work methods and finally will increase their production. Thus, bengkuang farmers have been able to learn from their previous experiences in farming. The longer they grow bengkuang, the more skilled they are, the more their knowledge increase and the higher their work motivation. Significant means that the experience of farmers has a good influence on increasing their bengkuang production. Increasing in production ultimately will increase their income and welfare.

The result shows the experience of farmers in the majority of 1-5 years. It illustrates that their experience in the bengkuang cultivation is relatively small. These experiences have an impact on their skills in cultivating the land, choosing seeds, managing bengkuang plants, harvesting and selling it. This means that with their current farming experience which is still relatively low, hopefully in the future, their production will increase, moreover they are willing to increase their knowledge and skills in farming. Thus there is still a big chance that the production of bengkuang by the farmer will increase as their experience increases. The coefficient of bengkuang farmer experience is 0.1475. This variable coefficient is smaller than the other two variables. This means that even though experience has a positive and significant effect, the effect is the smallest compared to other variables.

Furthermore, entrepreneurs with professional experience (before starting a company) achieve greater entrepreneurial success than people without such experience [8]. The study found that the age, education and experience effect on succession of entrepreneurs [9]. There is a significant relationship between the age of entrepreneur with business success [10].

##### B. The influence of Working Hours on the Amount of Bengkuang Production

Based on the results of data analysis, it is known that the working hours of farmers have a significant effect on the production of bengkuang in Padang City. The magnitude of the coefficient obtained is 0.4207. Thus the direction of influence is positive. Significant influence means that the amount of bengkuang production is affected by the length of the farmer's working hours. Working hours in this case are determined by the length of time the farmer works and the number of working days each week. The longer the working hours, the more production of farmers. If farmers want to increase their yields, then they must reduce the time to relax or chatting in the shop. If it is compared to the other two variables, the coefficient of working hours of farmers is greater than experience, but smaller and land area.

From the results of the analysis and description of the data it is also known that the working hours of farmers in a day vary from 4 to 8 hours. As many as 38.46% of farmers work 5 hours a day in the fields, while 23.08% of farmers work only 4 hours a day. Moreover, farmers who worked 8 hours were only 5.13% and those who wanted to work 7 hours were 7.69%. This means that farmers' working hours still can be increased so that their time is more effective and more beneficial for bengkuang production.

In every business, labor is a person who work in a production process of goods or services, so that working hours will affect toward business productivity [11]. The more labor used in the production process, the more output can be produced in the production activities. An increase in the number of workers will be able to provide an increase in output in the production process [12].

The length of farmers working hours have a significant effect on the productivity, which in turn determines the farmer's household income [13]. In addition, farming is similar to the other industries that requires capital and technology in running their businesses. Therefore, capital and technology have a significant effect on the development of farming [14].

##### C. Effect of Land Area on the amount of Bengkuang Production

Every farmer needs land to work on. The results of the study showed that the land area had a positive and significant effect on the amount of their production in Padang city. The magnitude of the coefficient of land area is 0.5113. Thus, the land area has a very significant effect on the total production of bengkuang in Padang City. The land area coefficient is the biggest compared to the other two variables. Therefore, the land area is the most decisive variable on the amount of bengkuang production. This is understandable because the land area is directly related to the amount of production. Therefore, if the farmer wants to increase the amount of production and their income as well, then the land area has to be added. But the main problem is the difficulty in finding land because its designation is changing from cultivation to housing.

Townsend et al., found that the farm size effects on performance or productivity of the farm, but this relationship is

somewhat controversial. The major theoretical interpretation of the study shows the positive relationship between firm size and the likelihood of survival [15].

Based on the results of data analysis and description of land area variables it can be seen that the area of land that is cultivated by farmers is relatively small. As many as 35.9% of them only process less than 1.9 Ha of land, 38.46% of the farmers in Bengkuang cultivate land between 2 to 2.5 Ha of land. Narrow land area will have an impact on the number of production of each harvesting time. There are three ways to increase land area. Namely, first by buying other farmers' land. This will be very difficult because of the difficulty of finding an appropriate land for bengkuang plants and/or the price is expensive. The second is by rent other people's fields. Third is by sharing profit with the land owner. From the results of the study, it is known that the generally bengkuang farmer applied profit sharing is 2:1, it means in the harvesting time, 2/3 of the amount production are for the land cultivator and 1/3 for the land owner.

#### V. CONCLUSIONS

The experience in cultivating bengkuang, working hours and land area has a positive and significant influence on the amount of bengkuang production. These three variables are in the condition of increasing returns. If all three variables are increased, the number of bengkuang production will increase as well. From the three variables, the land area has the greatest influence coefficient, then working hours and the last influence coefficient is farmer's experience.

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