Analysis of Feasibility and factors Affecting Production of Sweet Potato Farming On Coastal Land in Gadingsari Village, Sanden, Bantul

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Abstract. Sweet potato is a type of secondary crop that is widely cultivated by farmers. The problem often faced by farmers is crop failure caused by pests, diseases and drought. This study aims to descriptively analyze costs, income, net income, profits, and analyze the factors that affect the production of sweet potato farming on the coastal land of Gadingsari Village, Sanden District, Bantul. This study uses primary data from 120 farmers taken at random. Data were obtained by means of interviews through questionnaires. Analysis of costs, income and feasibility using a quantitative approach and analysis of the factors that affect the production of sweet potato on coastal land using the Cobb-Douglass production function approach. The results showed that sweet potato farming in Gadingsari Village was profitable with an income of Rp 2,247,361. Sweet potato farming is feasible to run based on R/C, working economy and working capital. Based on the results of Cobb Douglas analysis, seed, K fertilizer, and labor factors have a significant effect on sweet potato production in coastal land.

1 Introduction

The utilization of Sanden beach sandy land for sweet potato farming is mostly carried out by the community. The processing of beach sand for sweet potato farming is different from rice fields. Coastal sand land is marginal land, which is land that has nutrient limitation characteristics. Marginal land refers to land that has low productivity in producing an agricultural product [1]. The beach sand field has high wind speed and brings sand material and chemicals from the seas that are not good for plants. One of the physical properties of sand soil is low moisture content, causing farmers to control irrigation. This resulted in farmers issuing higher labor costs for watering. In terms of sweet potato production results produced from sand, fields tend to have smaller sizes, rough appearance, and holes due to pests and fungal diseases. This is similar to the sweet potato, which is produced from rice fields that have better size and appearance. In terms of price, sweet potato, coastal sand, and paddy fields have a higher selling price of IDR 7,500 per kilogram.

Sand land as a planting medium has physical and chemical properties that do not support plant growth, so proper and optimal processing is needed. Dasgupta et al. [2] said that climate change in coastal areas would worsen soil salinity so that it would affect the

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yield of a plant. This condition caused a decline in rice output in Bangladesh by up to 15.6%. The low soil salinity caused difficulties in potato cultivation because it was only able to produce 0.3 - 0.5 grams of potato bulbs. For this reason, a better understanding of the interaction of the system with the economy of coastal management is needed so that the use of sand soil as agricultural land provides maximum results [3]. Riwandi et al. [4] said that improving soil properties can be done by adding compost and biological fertilizers. Hasibuan [5] explained that cow manure, chicken, Gamal leaves, and Angsana leaves affect the improvement of the physical and chemical properties of sandy soil. The improvement of the physical and chemical properties of the soil will provide better results for plants. However, giving manure rate of 20 tons/ha to 100 tons/ha does not affect the growth and yield of sesame in coastal sand [6].

Sweet potato farming in coastal sand fields requires no small amount of money. Faidah et al. [7] said the factors that influence the income of sweet potato farming in Batang District revealed that the average cost incurred by farmers was IDR 2,275,814 per season. The study by [8] on the feasibility of sweet potato farming with the application of rolling technology on acid dry land in Lampung revealed that the largest receipts of sweet potato farming use a large gulud system. Widodo [9] revealed that sweet potato farming in coastal sand land in Bantul Regency had the largest income in dry season 2 that was IDR 538,211. As for Sundari et al. [10] it revealed that the profits obtained by sweet potato farmers during the planting period amounted to IDR 4,359,800. In terms of business feasibility, Habib & Risnawati [11] stated that sweet potato farming in Hesa Perlompongan Village, North Sumatra is feasible because the value of R / C is more than 1, which is 2.35. Santoso et al. [12] concluded that sweet potato farming in Mirit District is feasible to be seen in terms of labor productivity and capital productivity. However, it should be noted that the business of sweet potatoes in coastal sand fields is prone to drought due to the physical properties of the soil which are low in absorbing water. Sanglestsawai et al., [13] said that based on stochastic functions, the risk of Bt corn production in the Philippines has a statistically strong average yield increase. Bt technology significantly reduces production risk because the effect of the increasing slope is stronger than the effect of increasing variance. Fauzan [14] also revealed that the risk of shallot farming income in Bantul Regency was 0.727 or 72.7%. Farmers could bear a loss of IDR 9,480,916.

Based on the description above, this study aims to analyze the costs, revenues, income, profits, feasibility, and to determine the factors that affect production sweet potato farming on coastal land in Gadingsari Village, Bantul.

2   Research Method

The base method used for this research is the descriptive analysis method. This research was conducted in Gadingsari Village, Sanden Sub-District, Bantul, and chose deliberately because this village was the center of sweet potato production in coastal land fields since 1996 [9]. The sample of farmers in this study amounted to 120 people taken by the census. The method of data analysis was by analyzing the feasibility and function *Cobb-Douglas* approach with using multiple regression model because to find out how much influence the production factors of sweet potato have on coastal land in Gadingsari Village, Sanden District, Bantul Regency.

3   Result and Discussion

The cost of total sweet potato farming consists of explicit costs and implicit costs. An explicit cost is a cost incurred by farmers in the production process. These explicit costs

include procuring production facilities, depreciation costs, and interest on loan capital, labor costs outside the family, and other costs. Implicit costs are costs that are not significantly incurred in the business but are taken into account. These implicit costs include the cost of labor in the family and the cost of own interest. Description of the total costs show in the following Table 1.

Table 1. Total Cost of Farm Potatoes In the area of 838.36 m^2

Description	Cost (IDR)
Explicit costs	1,443,247
Implicit costs	934 642
Total Costs	**2,377,889**

Total costs incurred in sweet potato farming on land sand are IDR 2,377,889.

3.1 Revenue, Income, and Profit

The receipt is defined as the value received from the sale of farm products which is the multiplication of prices with the amount of production. Income is the difference in the total revenue with all the explicit costs or costs spent on production, while profits are total revenues that are reduced by total costs such as explicit costs and implicit costs.

Sweet potato farmers in the beach sand market in marketing the production of sweet potato tubers using two methods namely sold to middlemen and sold by themselves. More details are shown in Table 2.

Table 2. Acceptance of Sweet Potato Farming

Description of	The Marketing System	
	Middlemen's	**Self**
Amount (Kg)	673.06	223.13
Selling Price (IDR)	4,000	7,034
Receipts (IDR)	2,692,250	1,569,625
Revenue Total (IDR)		**4,261,875**

Table 2, shows that the income obtained by farmers by selling their produce is greater than the one sold to middlemen. That means that independent sales will be more profitable than selling to middlemen. However, in reality, most farmers still prefer to sell to middlemen rather than selling directly. Sweet potato farmers in coastal sand areas generally also have paddy fields for farming and require not less capital. Therefore farmers prefer to sell to middlemen with cash payments compared to selling by themselves. The value is not received directly but gradually. The revenue and profits obtained can be seen in the following Table 3.

Table 3. Income and Profit of Sweet Potato Farming

Description	Value (IDR)
Cost Explicit	1,443,247
Implicit Costs	934,933
Revenues	4,261,875
Income	2,818,628
Profits	1,883,695

Table 3, shows that income and profits from sweet potato farming in coastal sand fields are low enough. That is because explicit expenditure is high enough. The difference between income and profit on average is quite a lot because the expenditure on labor in the

family is also high. The amount of income and profits of sweet potato farming are also influenced by farmers' sales methods that also influence revenue. The method of selling itself is higher than being sold to middlemen. That means that the more farmers make their sales, the higher the income they receive. High acceptance value will increase the income and profits obtained by farmers.

3.2 Feasibility of Farming for Coastal Sand Fields

Feasibility analysis is used to see whether a business that will carry out provides benefits or not. The feasibility of sweet potato farming in coastal sand in Gadingsari Village is measured by R / C, labor productivity, and capital productivity.

3.3 R/C

R/C or Revenue Cost Ratio is a measurement of the use of costs in the production process. The result of the R/C analysis for farming sweet potato beach sand has shown in Table 4.

Table 4. R / C Analysis

Description of	Value (IDR)
Revenues	4,261,875
Total Costs	2,377,889
R / C ratio	1.79

Based on Table 4, the results of the R / C analysis show that sweet potato farming in coastal sand areas is feasible, this means that for every IDR 1 of the costs incurred, the farmer will receive an income of IDR. 1.79 from sweet potato farming on the coastal sand fields.

3.4 Labor Productivity

Table 5. Analysis of Labor Productivity

Description of	Value
Income(IDR)	2,818,628
Own land rent	0
Private capital interest (IDR)	33,103
Labor amount (HKO)	13,6
Labor productivity	**204,292**

Table 5, shows labor productivity results of IDR 204,292. wages for construction workers that apply in the study area, namely IDR. 80,000. That means that sweet potato farming of beach sand land is feasible to cultivate where the labor that farmers have will be more profitable if it is used for sweet potato farming in coastal sand compared to being a construction worker.

3.5 Capital Productivity

Table 6, shows that sweet potato farming is suitable for beach sand endeavored because the capital productivity value is greater than the loan interest rate. The capital productivity value is 133% while the interest rate of BRI bank loans for agricultural businesses for 4 months is 2.33%. The results of the analysis related to capital productivity in sweet potato

farming on coastal sands. That is influenced by the expenditure of explicit costs, production results, and cultivation techniques. Expenditures are high when the risk of high production losses results in low income from farmers.

Table 6. Analysis of Capital Productivity

Description of	Value
Revenue (IDR)	2,818,628 TKDK
Value 901,539	Own
land rent	0
Explicit total costs	1,443,247
Capital productivity (%)	**133%**

3.6 Analysis of Factors Affecting Sweet Potato Production

Analysis of factors affecting sweet potato production on coastal sandy land using Multiple Linear Regression analysis. The factors are land area (X_1), seeds (X_2), manure (X_3), N fertilizer (X_4), P fertilizer (X_5), K fertilizer (X_6), liquid insecticide (X_7), and labor (X_8). Decree of the models tested by using statistical test, the $_{ttest,}$ test F_{count} and the coefficient of determination adjusted *R-square* (adj).

Table 7. Results of regression factors that influence the production of sweet potato on a sand beach in the village land Gadingsari for one planting season per 995.75 m²

Variable	Regression Coefficients	t Count	Sig
Constant	13.695	**2.667***	0.012
Land	-0.248	-0.910	0.370
Seed	0.642	**2.803 ***	0.009
manure	0.193	1.130	0.267
Fertilizer N	-0.186	-1.604	0.119
P Fertilizer	-0.597	-1.588	0.122
Fertilizer K	0.869	**2.337 ***	0.026
Liquid Insecticide	0.013	0.487	0.630
Labor	0.445	**2.175 ***	0.037
R square	0.681		
F arithmetic	8.259		0.000
Specification	F table	α= 5% = 2.25	
	T table *	= 5% = 2.036	
	T table **	= 10% = 1.693	

Based on Table 7 indicate that the results of multiple linear regression analysis performed in this study showed the coefficient of determination (R^2)of 0.681 which indicates that the dependent variable or variables sweet potato production can be explained by the variable land area (X_1), seeds (X_2), manure (X_3), N fertilizer (X_4), P fertilizer (X_5), K fertilizer (X_6), liquid insecticide (X_7), and labor (X_8) by 68%, while residual percentage of 32% can be explained by other variables not included in the analilis multiple linear regressionsuch as the age of the farmer, farming experience, education level, number of dependents, solid pesticides, and natural conditions that are difficult factor to measure.

Based on the calculation results in Table 7, the value is $F_{calculated}$ 8.259 and the value is F_{table} of 2.25 which means that the value $F_{calculated}$ is greater than the F_{table} at an error rate of 5%, so that Hi which shows the variables of land area, seeds, manure, N fertilizer, P

fertilizer, K fertilizer, liquid insecticide, and labor together have a significant effect on the production of sweet potato on coastal sandy land in Gadingsari Village, Sanden District, Bantul Regency.

The seed variable has a significant effect on sweet potato production. The regression coefficient value of the seed production factor is 0.642 with t_{count} 2.803 > t_{table} 2.036 at an error rate of 5% which means that seed production factors affect the production of sweet potato on coastal sandy land in Gadingsari Village. If the addition of 1% seeds, the production will increase 0.642% with the assumption that other input variables are constant. The use of seeds at the research site uses seedlings from sweet potato shoots cuttings that are in accordance with the SOP for sweet potato cultivation. The seeds used by farmers are derived from paddy fields obtained from buying at the Sorobayan market. Seedlings purchased by farmers on a per bunch basis with each bunch containing 20 stems of sweet potato shoot cuttings. This research is in line with research entitled "Revenue and Technical Efficiency of Sweet Potato Farming in West Java Stochastic Frontier Approach" that the use of seeds has a significant positive effect on sweet potato production at the 95% confidence level.

Variable factor K fertilizer production affects the production of sweet potatoes. It is known that the regression coefficient of K fertilizer production factor is 0.869 with a t-value of 2.337_{count} > t_{table} 2.036 at a level confidence 95%. This means that the K fertilizer production factor significantly affects the production of sweet potatoes on coastal sandy land in Gadingsari Village. If the addition of the K fertilizer variable by 1%, the production will increase by 0.869%. At the study site, the average amount of K fertilizer given by farmers was 22.50 kg/995.75 m². It is necessary to add K element fertilizer so that sweet potato production increases more. Plants that produce tubers really need large amounts of K for the tuber enlargement process, this is also seen from the availability of nutrients in the soil. This research is in line with research entitled "Revenue and Technical Efficiency of Sweet Potato Farming in West Java with the Stochastic Frontier Approach" that the use of K fertilizer has a positive effect on increasing sweet potato production with a regression coefficient value of 0.014.

Variable labor production factors affect the yield of sweet potato production. It is known that the labor production factor regression coefficient of 0.445 can be interpreted with every increase in the use of labor by 1%, the production will increase by 0.445% with the assumption that other input variables are constant. The t-$_{count\ value\ is}$ 2.175 > t-$_{table}$ 2.036 at thelevel confidence 95%. This means that labor production factors significantly affect the production of sweet potatoes on coastal sandy land in Gadingsari Village. This is in accordance with the condition of farmers in the coastal sandy land of Gadingsari Village, which is still dominated by farmers of productive age. 95% of sweet potato farmers on coastal sandy land in Gadingsari Village are of productive age. Farmers who have a productive age can do their work to the fullest with their abilities. This research is in line with study entitled "Factors Affecting Red Chili Production" that the use of labor significantly has a significant effect on red chili production.

4 Conclusion

Costs incurred by farmers in sweet potato farming on coastal sand are IDR 2,377,889. The income, income, and profits obtained by farmers in a row amounted to IDR 4,261,875, IDR 2,818,628, and IDR 1,883,986. Sweet potato farming of beach sand land is feasible to be seen from three categories, such as R/C, labor productivity, and capital productivity. From the results of the study the factors that significantly affect the production of sweet potato on coastal sandy land in Gadingsari Village are seeds, K fertilizer and labor, while

land area, manure, N fertilizer, P fertilizer, and liquid insecticides have no significant effect.

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