

Economic Potential Based on an Engineering Analysis of Jackfruit Waste as Food Biopreservative Packaging to Alleviate Poverty in Lombok Barat, Nusa Tenggara Barat

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Abstract

Rate of poverty and unemployment in Lombok Barat shows high percentage 17.11 % of total population and 3.35% of total labor-force. Seventy percent of poverty in Lombok Barat is a farmer. That was caused by their incapability to give additional value to their product. Whereas, Lombok Barat is the biggest producer of jackfruit in NTB which its waste can be made as biopreservative packaging that is incorporated with clove oil as antimicrobial which can be economically benefits to alleviate poverty and unemployment. Economics potential of jackfruit waste packaging was used Cooperative Economics Sytem which is the owner of company based on Kelompok Tani in each sub-district in Lombok Barat. Value of company's feasibility and profitability was conducted with Engineering Economics Analysis. The result of analysis shows that BEP value 42,06% and profit per year Rp. 124,847,815,400.00 with capacity 4 tons/day, ROI 76.04% and POT 1.31 year. The analysis also shows the product's price is Rp. 25,000.00 which is still competitive with conventional's price. It can provide a new job vocancies which is estimated reduce poverty rate and unemployment rate 1.0% and 0.23%, respectively.

Keywords:

Jackfruit Waste; Lombok Barat; Economic Analysis; Poverty

PENDAHULUAN

NTB is one of the ten poorest provinces in Indonesia that has rate of poverty 15.05% (748,120) in 2017. One of region in NTB which still left behind is Lombok Barat that has rate of poverty 17.11% (113,138).

Jackfruit is one of the biggest horticulture products in Lombok Barat which is 15,766 tons in 2015³. Most of people sell it to distributors and consume the fruit's flesh. Its seed and straw usually wasted. Whereas, it can be made as edible film that's economically benefit.

Edible film is an eco-friendly food packaging that's produced from edible biopolymers (starch, pectin, etc).

In order to preserve food, it will be enriched with clove oil that has strong antimicrobial and antifungal that can be used as preservative in food products.

Therefore, there will be company based on Cooperatives Economic System in which its members consist of *Kelompok Tani* from all sub-district in Lombok Barat that produce the product. Engineering Economic Analysis was used to estimate its feasibility (BEP) and profitability (ROI).

RESULT AND DISCUSSION

Current Problematic Condition

Number of unemployment in Lombok Barat is 10,379 (3.35% of total labor-force) in 2016⁶. Seventy percent of poverty in Lombok Barat is farmer. Due to their incapability to give additional value to their product. For example, in durian season, many jackfruit were wasted because of not sold⁷. Furthermore, farmer usually sell them to distributor and paid with under market price, cause them hardly to increase their income.

Stakeholders Analysis

1. Government

Government has important role to make regulation about financial aid, provide training, make cooperation with university, and BUMN Bank. Government also monitor the activity until they're independent.

2. *Kelompok Tani*

Kelompok tani is a group which its members consist of farmers. It has big role to run company based on cooperative economics system.

3. Jackfruit Farmers

Jackfruit farmers will be as feedstock-supplier. They will sell the fruit or raw material to company.

4. University

University will provide good trainer to empower *Kelompok Tani* such as basic cooperative economics system, human resources management, basic industrial science, financial management, etc.

5. BUMN Bank (State-Owned Bank)

BUMN Bank will give support by giving debt with lower interest.

Innovation

Company based on Cooperative Economic System

Cooperative economics system is an economics system which is financially based on their members⁹. Members of cooperatives consist of *Kelompok Tani* in each sub-district of Lombok Barat. Therefore, capital is coming from them and government's subsidise.

There will be 2 kinds of factories which are Factory A and B. Both factory is facilitated with renewable energy of solar cell to achieve eco-friendly factory.

Unit Factory A

In unit factory A there are 2 kind of processes, first is isolation of starch from jackfruit's seed and straw. Jackfruit's seed and straw have washed then shredded.

Next, filter with addition of water and press with cloth filter. After that, filtrate is precipitated. Supernatant liquid is discarded and precipitate washed repeatedly until starch precipitate clearer. Next, starch precipitate is dried with oven on $\pm 500^{\circ}\text{C}$ for 2 hours until dry.

Second process is production of packaging. Dissolve jackfruit peels starch on 100 ml aquades which has concentration 2%, (weight/volume). The mixture is stirred and heated with hot plate until 70°C for 15 minutes. Next, add 30% glycerol (weight/weight, starch). Next, add 4% clove oil as antibacterial agent (volume/volume) from edible film. Then, pour edible film on plate glass which two sides clean with alcohol 96%. Last, edible film was allowed to dry.

Unit Factory B

The main raw feedstock of product are jackfruit waste (seed and straw) and clove oil. Jackfruit waste contains 70% of starch which is the main compound to make edible film. The raw feedstock is obtained from jackfruit farmers. Jackfruit farmers will sell the fruit to Unit Operation B. Unit operation B will buy it with proper price and sell the flesh of jackfruit to the market with unique packaging. Then we can obtain jackfruit straw and seed as raw

material to make biopreservative packaging. Clove oil is obtained from clove oil farmers in NTB.

Product's Excellence

Edible film enriched with clove oil can be applied as preservative of various food products such as food derived of meat and fish, traditional foods, fast food, etc. It will be as inner layer packaging of food which can extend shelf-life more than 60 days approximately.

Beside of its capability to preserve food, biodegradable films can also improve the quality of food product's appearance due to reduction in moisture loss and lipid oxidation.

Furthermore, the product will be standardized with global qualification so its potential can be exported abroad.

Engineering Economics Analysis

Engineering Economics Analysis was conducted in this study, it can be obtained value of BEP is 42.06 % or 13.9 million.kg/year that shows company financially good because it result profit when production under 50%. ROI is 76,04% and POT (Pay Out Time) is 1.31 which mean company can get their investment back when production has been 1.31 year with profit/year Rp.

124.847.815.400,00 and capacity 4 tons/day. The price is Rp. 25.000,00/kg which is still competitive. Sensitivity analysis with scenario that feedstock's price increase 10%, company still gaining profit/year Rp. 79,291,000.00 with POT value 2.18.

Company can create 719 job vacancies approximately will contribute to reduce poverty and unemployment rate 1.0% and 0.23%, respectively. Therefore, it is feasible and potential to be built in Lombok Barat.

Market Analysis

Lombok island is a tourism place that attract many people from outside NTB and foreign people with total of tourist visit 3.5 million in 2017¹⁵. It makes demand of food souvenir always increase which inline with demand of food packaging. Then, people around the world especially from developed country such as Australia, Japan, and Europe countries have more interest healthier product which mean there is an export chance to expand market abroad.

Benefits

Jackfruit farmers can avoid losses and get higher income because they can sell product in any fruit's season and sell

directly to market which has higher price than distributor's. Then, reducing damages that caused by plastic waste which make better environment and create better tourism places that can interest more people to come.

CONCLUSION

Based on economic analysis was conducted, it can be concluded as follow: First, the product can effectively preserve food in various types which can extend its shelf-life more than 60 days approximately. The product also have better appearance which make more competitive than conventional one.

Second, based on Economics Engineering Analysis, BEP value is 42.06% which has passed standard of feasibility. Then, ROI value is 76.04% and POT is 1.31 year which has value of profit per year Rp. 124,847,815,400.00 with capacity 4 tons/day. Eventhough, when main price of feedstock suddenly increase 10%, it can still gain profit/year Rp. 79,291,000.00 with POT value 2.18. Therefore, it is feasible and potential to be built.

Third, with price of Rp. 25,000.00/kg, product can compete with conventional packaging and its potency to be exported to developed countries

Fourth, economics potential shows can reduce 1.0% of poverty rate and 0.23% of unemployment rate, increase society's income, and better environment.

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