

## Study of Feasibility Integrated Agroindustry Development Unit Black Grass Jelly Powder (*Mesona palustris*) in Province of East Java

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### Abstract

Potential of black grass jelly plant in Indonesia is very prospective. These plants grow in areas such as Malang East Java, Pacitan, Magetan and Ponorogo. In 2010 the production of dried black grass jelly of 568 tons with a total productivity of 8.6 tons / year. Location selection of the plant with a score weighting method produces the highest value of 4,16 for the city of Surabaya, so the establishment of the plant will be held in Surabaya. Therefore, it is necessary the application of a suitable drying models for this factory that is tunnel dryer based on the results of research and with the highest value is 4,281. To ensure the availability of black grass jelly dried leaves as raw materials of black grass jelly powder it is necessary to establish a partnership between farmers and companies. The partnership pattern that works best for black grass jelly powder factory is a partnership "inti plasma". It is based on research with the results of the assessment and weighting by using pairwise comparison and rating scale, the value of the highest weight in the "inti plasma" partnership with a value of 4,893. By implementing this partnership will allow the factory to obtain raw materials easily and is more economical and can always be available throughout the year for partnering with farmers.

**Keywords:** black grass jelly powder, drying method, financial feasibility analysis, partnership patterns

### INTRODUCTION

Potential or tentative black grass jelly plant in Indonesia is very prospective. These plants grow in areas such as Malang East Java, Pacitan, Magetan and Roxburgh. In 2010 the production of dried black grass jelly (provisional) of 568 tons with a total productivity of 8.6 tons / year. This plant is a crop cultivation potential to be developed. Tentative can be used as a beverage product fresh, black grass jelly can also be used as a cure of diseases such as fever, diarrhea, and high blood pressure. In the Indonesian state, provisional only processed into fresh drinks (jelly / cao) and SMEs engaged in these drinks are very limited, so the development of black grass jelly products are less encouraging. This is due to the majority of people who do not know the potential and nutritional content contained in the black grass jelly. Black grass jelly or dazzling palustris contains a wide variety of bioactive compounds such as antioxidants, antibacterial, antimutagen, and antihypertensive contained in the black grass jelly [1,2,3].

This is supported by research which states that in the black grass jelly there are several active components that have a functional value of which is a class of polyphenols, saponins, flavonoids, and other alkaloids [4]. The content of polyphenols contained in the leaves of

grass jelly in addition to functioning as a potent antioxidant is also believed to prevent and deadly microbes, so that leaves grass jelly potential as an antibacterial [5].

The content of nutrients contained in the black grass jelly is very useful so necessary to the development of agro-based integrated black grass jelly. In the black grass jelly production system, there are several sub-systems which are the raw material inventory sub-system, sub-system product design, and subsystem black grass jelly powder production. In the sub-system procurement of raw materials there are problems that the raw materials are not available throughout the year and post-harvest handling technologies tentative (black grass jelly dry). Black grass jelly agro-industry requires raw materials tentative continuously in order to keep the industry operates. Tentative drying method used by the farmers still conventional namely with the aid of sunlight. This drying will not be optimal when the rainy season arrives. During this time the farmers provisional anticipation by fumigation. This leads to reduced content and nutrients contained therein and create public confidence will be reduced black grass jelly products, both people inside the country and abroad. Therefore, the necessary drying method is efficient and practical so easily operated by the farmer as well as the right partnership model to provide raw materials throughout the year.

Mass production of black grass jelly products are limited to black grass jelly gel. On product shelf life is not long because it contains a lot of water that can potentially become a breeding ground for bacteria. It is a weakness of

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black grass jelly gel products so as to anticipate product diversification in the form of black grass jelly powder and processed derivatives which can be used as an alternative to increase the added value of black grass jelly. Black grass jelly powder product quality of research results Cholilie [6] showed that the powder has a moisture content, carbohydrates, crude fiber, and yield respectively by 12.25%, 43.7%, 5.89% and 16.28% , In addition, the effervescent tablet is also the result of black grass jelly derivative products that have been investigated by Maulidy [7] mentions that the tablet has antioxidant activity amounted to 94.588 ppm, speed dissolve 0.02 g / sec, and a water content of 9.4%.

Excellent prospects of black grass jelly products have become attractive opportunities and needs to be developed. This is supported by Widyaningsih [8] which states that in Indonesia grass jelly is not a lot of new products are produced, while demand continues to rise. Black grass jelly raw materials originating from Indonesia are used for a variety of refined products in supermarkets grass jelly with a very high price as products imported from Taiwan, Singapore, and Malaysia. Therefore, with this study, it is expected to provide information about the establishment of plant agro-integrated grass jelly black with drying method and optimal pattern of effective partnerships by utilizing local resources that aim to reduce dependence on imported products and to meet the needs of grass jelly black inside country.

## RESEARCH METHOD

### Type of Research

The research was quantitative and qualitative research. Quantitative research is research by calculating of respond analyzing expert to determine the drying method, projected raw material requirements (dry black grass jelly ) and dry black grass jelly demand and financial feasibility of the plant to be established. Qualitative research is research conducted by descriptive analysis in determining the location of the plant, production capacity, market segmentation (secondary data), a marketing strategy and target market to be targeted.

### Limit Problem

Several assumptions were used in the study of this research are:

1. The raw materials used have a stable quality.
2. Cash flows recorded for the project during 20 years period of operation
3. The cost and financial feasibility only applied on the present calculation
4. The effective interest rates 11%
5. Research the double scale used is based on research Cholilie<sup>6</sup> on Powder Production Efficiency Analysis Black Grass Jelly (*Mesona palustris*) on Scale Doubles

### Methods

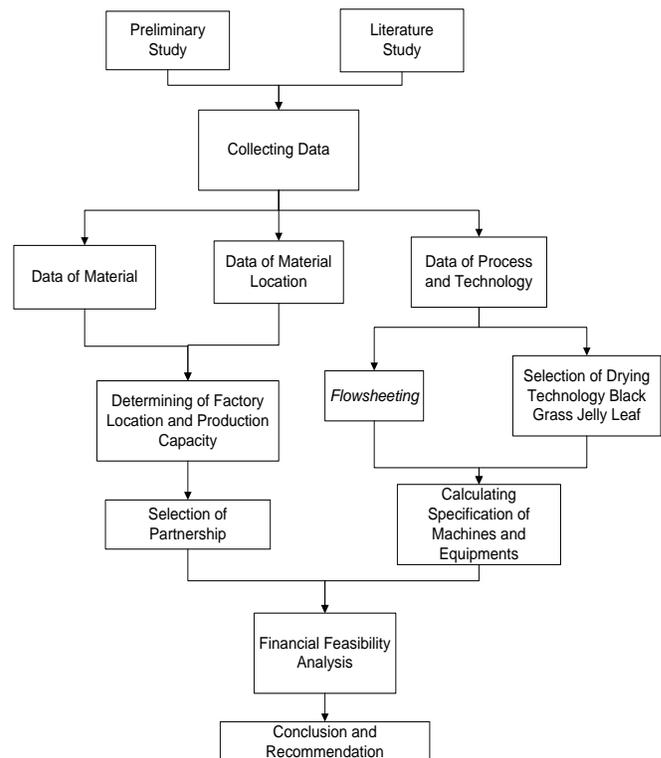
#### a. Analysis of Plant Site Selection

Determining the location and productivity of black grass jelly based on assessment scores and weights to the

factors site assessment. The following factors into consideration determination of the location:

1. The distance of raw materials source
2. Location
3. Workforce
4. The distance of marketing area
5. Transporting infrastructure
6. Energy utility
7. Waste management and industrial environments

The method used is a weighting score method in which the determination carried the load balanced qualitative and descriptive, but the assessment is done subjectively. This method is done by giving a score to each factor assessed against the alternative location of the factory.



Picture 1. Flow Diagram of Research Implementation

#### b. Efficiency Drying Technology Analysis of Black Grass Jelly Leaf

Method analysis of drying machine black grass jelly raw materials based on several considerations such as:

1. The investment
2. Application Technology (Ease of Operations)
3. Energy Efficiency
4. Quality of Drying

Taking of data to determine the method of drying by using questionnaires distributed to the experts. Experts involved in determining optimal drying method is an expert of mechanics agricultural products. Respondents consisted of 4 peoples. The method used to select the drying technology is the AHP (Analytic Hierarchy Process).

**c. Analysis of Effective Partnership to Provide Raw Material Black Glass Jelly**

Analysis of effective partnership pattern to provide raw materials of black grass jelly, a few considerations to determine the most effective partnership model:

1. Type of industrial sector
2. Type of business entity
3. Large capital employed
4. The range of time contracts
5. Type of business contracts
6. The division of authority and responsibility of work
7. System for the results applied

Collecting data to determine patterns of an effective partnership is using a questionnaire that was distributed to the experts. Experts involved in determining the partnership pattern of agribusiness experts from academia and industry. Respondents consisted of 4 peoples. The method used to select the model drying is AHP (Analytic Hierarchy Process).

**Weighting variable assessment using pairwise comparison method**

The basic concept of AHP is use pairwise comparison matrix to produce relative weights between criteria and alternatives. Weighting was done by pairwise comparison method. The weighting assessment was done by comparing each factor that affect the determination of industrial partnership pattern. In determining the weight of each variable was used a scale value of 1 to 3.

**Variable scoring of partnership pattern using rating scale method**

Weighting was done by rating scale method is the assessment of significance corresponding variables in the model partnership with use value scale 1 to 5.

**RESULT AND DISCUSSION**

**a. Analysis of Plant Site Selection**

East Java has the four highest black grass jelly producing region are Malang, Magetan, Ponorogo and Pacitan. The potential productivity of each region varies only Ponorogo and Pacitan which has a higher potential with total production in 2010 which is 268 tons and 230 tons / year [9]. Although the four areas have considerable potential to set up a factory but the distance to the market at issue consideration of the establishment of the factory. The main target market is the central area of the East Java city of Surabaya. Surabaya municipal elections as a marketing center in addition to the town center which offers a great opportunity for new products is also considering marketing distribution easier by land, sea, or air. Therefore, to minimize transportation costs from the sourcing of raw materials to the marketing area and reduce distribution costs of marketing the plant to be established in the city of Surabaya.

Factory location selection of several factors namely the distance to the source of raw materials, the suitability of the location, manpower, distance to the area of marketing, transport infrastructure, energy

utilities and waste management. From these considerations within the marketing area has the highest weight because it relates to transportation costs. High transportation costs in marketing the products in the area of marketing can increase production costs. Location selection of the factory establishment in Surabaya based on the calculation method of weighting scores with a value of 4.16. It can be seen at Table 1.

**Table 1.** The Result of Calculation Weighting Score Method

No.	Alternative Region of Factory Establishment	Weighting and Score Value
1.	Malang	3,44
2.	Magetan	3,3
3.	Ponorogo	2,76
4.	Pacitan	2,74
5.	Surabaya	4,16

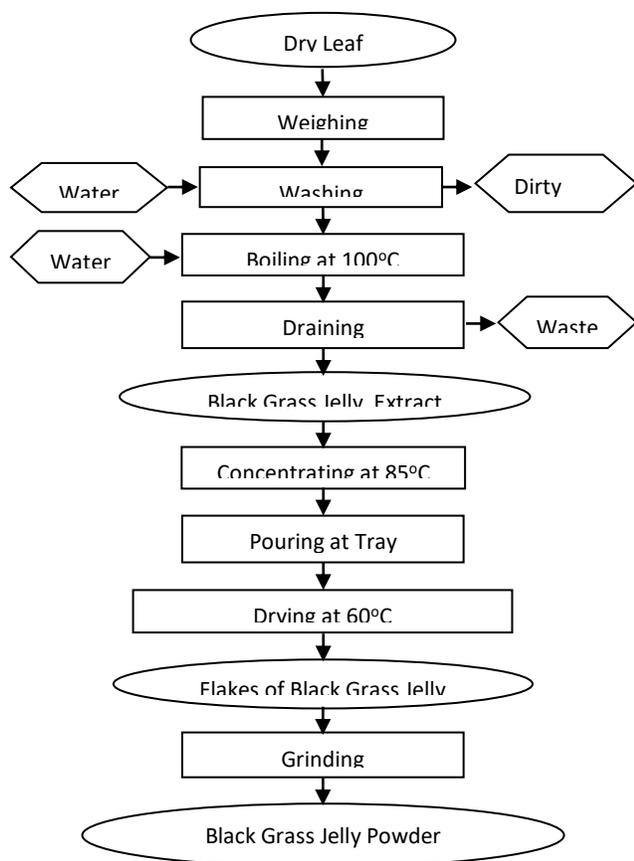
Source : Data Processed, 2015

Based on Table 1. Surabaya city becomes best alternative for plant building. It can minimize material transportation cost and decrease production cost. Surabaya is second biggest metropolitan in Indonesia with participation level for labor is 66,12% and the sum of unemployed peoples is 71.99% in 2012 [10].

**b. Efficiency Drying Technology Analysis of Black Grass Jelly Leaf**

Drying technology becomes very considered in the processing of agricultural products. This is due to maintain the quality of agricultural produce be maintained and preserved by the production process. Black grass jelly leaf is one of the commodities that require drying stage as one method of food preservation. Dried black grass jelly leaf will be easier was distributed and saved on transportation costs. Black grass jelly wet leaves will easily rot because the process of transpiration (evaporation) is still in progress so susceptible to decomposition and mushrooms (because of the presence of water from food). In addition, when the leaves are still wet black grass jelly will be able to increase the cost of transport to the place of production processing and quality can not be guaranteed when he arrived at the company because the material will undergo severe shrinkage and companies will suffer losses owing to transportation costs to swell.

During this time, farmers using conventional methods in the preservation and drying of the black grass jelly leaf by using sunlight. Advantages of this method is economical in its financing, but the results obtained production slightly because depending on the length of sunlight and drying. In addition, this method has a drawback with the change of season that makes drying process is not optimal so that the volume of the resulting material becomes a bit and is not suitable for the needs of the company.



Picture 2. Black Grass Jelly Powder Production Steps

Therefore, it is necessary that a suitable drying technology and can meet the raw material requirements of the factory.

From the research conducted, and selection of a suitable drying method to be applied to farmers is that there are several methods of drying which can be an alternative to the conventional drying method of drying (sun drying), drying the tobacco drying oven and tunnel dryer. This research was done by taking data from the expert respondents agricultural mechanization expert and entrepreneur black grass jelly powder in Malang. The election of the four factors to consider that the investment required, application technology, fuel efficiency, and quality of drying. Through pairwise comparison method and rating scale of the obtained results that conventional drying, drying with tobacco drying oven, tunnel dryer and each has a value of 1.000; 3.688; and 4.281. It can be seen at Table 2. This means that the chosen method for drying leaves of black grass jelly is a tunnel dryer. This machine has the investment cost is quite expensive and require socialization and training in its operation so that it will be included in the CSR (Corporate Social Responsibility) companies so that the welfare of farmers can increase because the cost of raw materials sold by farmers will increase and profits for the company is its raw material needs can be met and minimize transportation costs because the material to be delivered has been a semi-finished goods.

**c. Analysis of Effective Partnership to Provide Raw Material Black Grass Jelly**

Efforts to meet the needs of black grass jelly raw materials, the company involves the role of farmers as suppliers of raw materials of black grass jelly.

Table 2. The Priorities Determination of Optimal Drying Method

No	Variables	Weights	Tunnel Dryer		Conventional Drying		Tobaccos Drying	
			Score	Value	Score	Value	Score	Value
1	Investment	0.229	4	0.917	1	0.229	4	0.917
2	Application Technology	0.229	4.5	1.031	1	0.229	4	0.917
3	Energy Efficiency	0.250	3.5	0.875	1	0.250	4.5	1.125
4	Drying Quality	0.292	5	1.458	1	0.292	2.5	0.729
TOTAL		1	4.281		1		3.688	

Source : Data Processed, 2015

Table 3. The Priorities Determination of Partnership Pattern

No	Variables	Weights	Inti Plasma		Sub-Contract		General Trade		Franchise		Agency	
			Skor	Nilai	Skor	Nilai	Skor	Nilai	Skor	Nilai	Skor	Nilai
1	Type of industrial sector	0.179	5	0.893	4	0.714	3	0.536	2	0.357	2	0.357
2	Type of business entity	0.111	5	0.556	4	0.444	3	0.333	2	0.222	3	0.333
3	Large capital employed	0.139	5	0.694	4	0.556	3	0.417	2	0.278	1	0.139
4	The range of time contracts	0.107	4	0.429	3	0.321	3	0.321	3	0.321	2	0.214
5	Type of business contracts	0.167	5	0.833	4	0.667	2	0.333	2	0.333	1	0.167
6	The division of authority and responsibility of work	0.147	5	0.734	4	0.587	1	0.147	2	0.294	3	0.440
7	System for the results applied	0.151	5	0.754	4	0.603	1	0.151	2	0.302	3	0.452
TOTAL		1	4.893		3.893		2.238		2.107		2.103	

Source : Data Processed, 2015

Fresh black grass jelly raw material (wet) will be supplied by farmers and further processing into a powder made of black grass jelly. In addition, the company will cooperate with farmers through a partnership as an addition to raw materials in the black grass jelly meets the needs of the company.

In general, most farmers do not know the benefits of black grass jelly plant as a whole, with the company of black grass jelly powder, it can increase the productivity of farmers as suppliers of raw materials in the future. In addition to the application of a partnership which can effectively improve the welfare of farmers because cooperating partners had a clear and run continuously. Several criteria were used in determining the pattern of such partnership is a type of industrial sectors are taken, the type of business entity that is used, the flexibility of the employment contract, the system used, the division of authority and responsibilities of work and the sharing system is applied.

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Based on the assessment variables partnership scheme carried out by some experts by submitting a questionnaire respondents partnership pattern. The results of the assessment showed that the plasma core ("inti plasma") partnership pattern is a pattern that is most suitable to be applied to the agro-black grass jelly powder. From the calculation and weighting performed plasma core partnership system scored highest is 4.893. A high value indicates that the core model of plasma levels of compatibility and suitability highest variables observed used in the weighting pattern of the partnership. It can be seen at Table 3.

Pattern plasma core partnership is one type of a partnership that is widely applied in various sectors of agro-industry. Industrial oil palm plantation and processing tea and coffee, maize breeding industry, the tobacco processing industry are some of the types of industries that have successfully implemented a partnership plasma core. The virtue of the application of this partnership is strong enough economic strength held so as to solve the problems of classics such as the cost and improve the quality of raw materials at the farm level. The farmers will feel the impact of the benefits by ensuring that products marketed and the price of agricultural products sold. While the company will be easier to control and supervise the supply of raw

materials from farmers and can more easily market products produced through the cooperation partner groups. Control the quality and quantity of raw materials can be done more easily through training and counseling with partner groups such as procedure and time of seeding and harvesting a good crop of black grass jelly, procedures for good farming and the percentage composition of the fertilizer is applied.

The core company has tasks such as coaching and development for the group owned plasma partners in the partnership. The company's core role in the provision of land, control technology, as well as technical guidance and production management so that these efforts can improve the productivity and efficiency of the plasma core partnership pattern. This development effort has a social responsibility that serves to encourage the partner groups can thrive in the long term. By applying a partnership, the plasma core problems faced by the core industry and farmers can be more easily resolved.

Application of plasma core partnership model for black grass jelly powder company will have a positive impact on the continuity of raw material available. Available raw materials can not meet the production needs of the company if it does not implement a partnership with farmers. Agro-industry concept is applied to enhance process flow from upstream to downstream so as to minimize the cost of the production process. Pattern plasma core partnership with the farmers into the concept of agro-industry upstream where farmers conduct mutually beneficial cooperation that is the ease of selling leaf black grass jelly and assurance of cooperation in the long term so as to improve the welfare of farmers. Moreover, the advantage for the company is the continuity of the available raw materials, quality assurance of raw materials from farmers and a more economical cost.

## **CONCLUSIONS AND RECOMMENDATIONS**

### **Conclusion**

Based on the research that has been done, some conclusions can be drawn with regard to the feasibility study model of the company's development of black grass jelly powder, they are:

1. To be able to produce continuously, black grass jelly powder processing industry to be constructed should take into account the availability of the raw materials used. Black grass jelly raw material potential in East Java is located in Malang area, Magetan, Ponorogo and Pacitan. Total production of dried black grass jelly leaf in a year reached 568 tons.
2. The company provides assistance in the form of a model drying tunnel dryer to make it easier for farmers to dry the leaves of black grass jelly. Through the program, the quality of raw materials dried leaves of black grass jelly company needs can be controlled according to quality standards of the company. Based on the calculation method of pairwise comparison and rating scale, the machine tunnel dryer has the highest

value compared to conventional drying and drying oven tobacco as a model for effective drying.

3. Efforts to do the company to obtain raw materials dried leaves of black grass jelly and continuous quality that is by involving farmers through the plasma core partnership program and corporate social responsibility. The partnership pattern plasma core selected based method of pairwise comparison and rating scale with consideration of the type of industry that is taken, the type of business entity that is used, the amount of capital used, the flexibility of labor contracts, marketing contracts, the division of authority and responsibilities of work and the sharing system implemented.

#### **Recommendations**

Based on the results of research conducted, it was found a few suggestions that can be submitted for further research, including:

1. It needs for a study on the model of empowerment and cooperation partner group of farmers in the provision of raw materials leaf black grass jelly.
2. It needs for a feasibility study of black grass jelly powder industry that integrates all aspects of industrial tree.

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