

## How to Increase Value Added of Porang (*Amorphophallus Oncophyllus*) as Forestry Commodity?

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— *Review of* —  
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### ABSTRACT

Plants Porang (*Amorphophallus Oncophyllus*) tend to have a high value if they are oriented for industrial purposes (Wida, 2012; Hidayat, Augustien & Kelvin, 2013). Industries that require Porang as raw materials can be divided into three groups, namely: (i) the food industry; (ii) the pharmaceutical industry; and (iii) the chemical industry (Khalimah, et.al, 2010). The realization of capital investment, both domestic and foreign, in the three types of industry in the last five years (2008-2012) tend to increase (except in 2010). This trend indicates that the Porang demand will increase. The potentials of Porang development in East Java, especially in Madiun, Nganjuk, Bojonegoro, Tuban and Kediri are very large. But there is still a barrier in the development from the aspect of production and marketing. Therefore, the main objective of this research is to examine how to optimize Porang Glucomannan cultivation business opportunities through Small Medium Enterprises (SMEs) in East Java. Based on the analysis of potential market opportunities, Porang business are very feasible to develop. It can be indicated from two aspects, namely (i) the potential market opportunity is huge, both from the approach of demand and supply; and (ii) the very high profitability from Porang business. While there are several challenges that need attention, including: (i) increased production problems, particularly related to low levels of productivity; (ii) the problems of poor infrastructure, especially those connecting centers of production and marketing centers; and (iii) the Porang business market structure that tend to be oligopsonistic.

**Keywords:** *Porang, Amorphophallus Oncophyllus, business opportunities, contract farming,*

### 1. INTRODUCTION

Indonesia is an agricultural country that is rich in the diversity of local food crops. Which one of the crops are Porang (*Amorphophallus Onchophyllus*) (Lastinawati, 2010; Rachmawati 2010; Faridah, et.al, 2012; Haryadi, 2012). Porang bulbs are rich in soluble glucomannan fiber. In the form of Porang flour, the glucomannan levels can reach 70-90% (Widjanarko et.al, 2011; Thomas, 1997). Katsuraya et.al (2003); Gao and Nishinari (2004); and Yang et.al (2006) mentions that glucomannan is a gelling agents which contain high soluble fiber, low in

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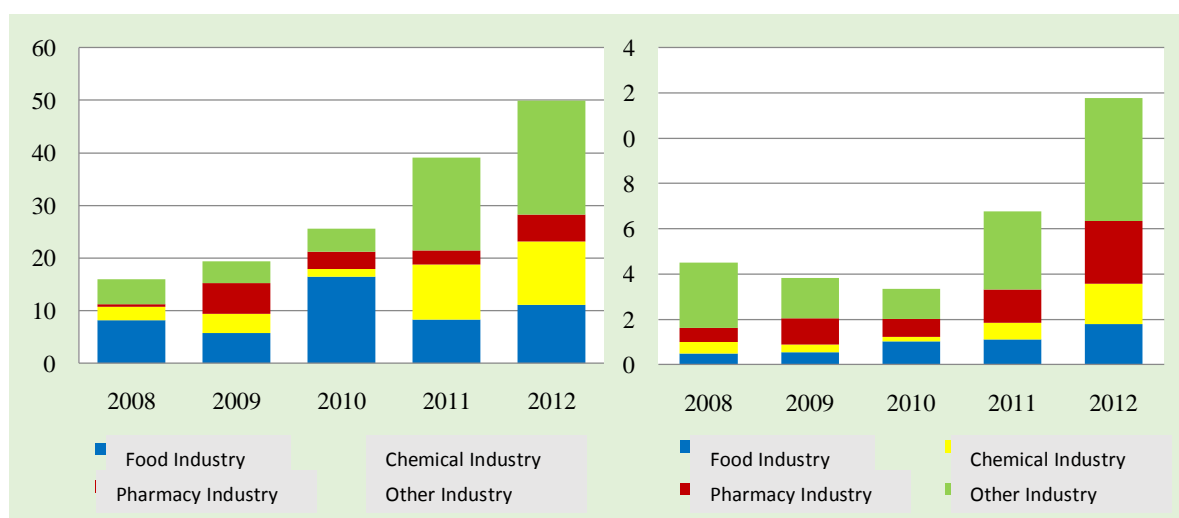
calories, and having a typical hydrocolloid. This indicates that Porang are having a high usefulness (Raharjo et.al, 2012).

If oriented for industrial purposes, plants Porang (*Amorphophallus Oncophyllus*) tend to have a high value (Wida, 2012; Hidayat, Augustien & Kelvin, 2013). Industries that require Porang as raw materials can be divided into three groups, namely: (i) the food industry; (ii) the pharmaceutical industry; and (iii) chemical industry (Khalimah, et.al, 2010).

Porang cultivation are having a large potential opportunity, this can be viewed from the aspect of demand both domestically and overseas. Domestic potential can be seen from the realization of capital investment, both domestic and foreign. On the domestic investment, the investment realization in industrial sources of Porang demand (food industry, pharmaceutical industry, and the chemical industry) in the last five years (2008-2012) tend to increase (except in 2010), as well as for PMA. This trend indicates that the Porang demand also tend to increase.

Figure 01. Domestic Investment Realization (Trillion IDR)

Figure 02. Foreign Investment Realization (Billion US\$)



Source: Investment Coordinator Institution of Indonesia, 2014

Meanwhile, when seen from the Porang export development, the rate of exports are quite high. As in 1991, the export volume reached 235 tons with a value of 273 thousand US dollars (Sufiani, 1993). Even in 1997, the Porang export which done to Japan, Malaysia, Pakistan, and the UK increased to 297.6 tons with a value of 349 614 US dollars. But in 1998, the export of these commodities declined, and this trend continued until 2010. The decline in the value of commodity exports Porang are not due to declining market demand, but the limited cultivation and domestic raw materials processed. So far, the supply is only fulfilled by small traders who collect bulbs that grows wild in the woods or around the plantation.

The area with the most potential for Porang development is East Java, are in Madiun, Nganjuk, Bojonegoro, Tuban and Kediri. However, the development of Porang still not done well (Hidayat, Augustien & Kelvin, 2013). This has become one of the weaknesses of Porang production systems, especially in East Java.

developed with a modern technology, a land area of 1000 hectares alone, will make an additional income of Rp. 60 M when sold in wet form (productivity of 10 tons / ha at a price of Rp. 6000.00), or Rp. 80 billion when in the form of dried chips (yield 20% dg chip price Rp. 40.000,00) or Rp. 15.9 T when sold in the form of glucomannan powder with levels above 80% (yield 30% bk at a price of Rp. 26.5 million / kg). But, until now, none of those Porang farmers can reach that level of productivity and income.

Based on the explanation, the high demand of Porang still can not offset by sufficient supply. Therefore, it is interesting to study how to optimize Porang Glucomannan cultivation. Therefore, this journal has two main research purposes. First, is to identify porang potential demand. And Second, is to identify the main factor that influenced porang farmer's income.

## 2. LITERATURE REVIEW

### 2.1. Farming Governance Strategy

Given the critical role and potential market prospects, we need a system that can capture the market potential and increasing the value added of Porang. The system can be emphasized in agro-industry mechanism that involving farmers.

By the time someone decides to start a business in the field of food, at the same time he should be able to plan their business activities as well (Rahmi, 2012). Business planning activities in the field of food at least follow several stages: **first**, to analyze the situation relating to the business of the food sector. **Second**, an understanding of the organization and corporate governance. **Third**, do a feasibility study. **Fourth**, managing production systems effectively and efficiently. **Fifth**, maintaining business sustainability. The five steps in business planning activities above have to be synchronized with the concept of planning in the operational calculation. The most important operational calculations must include at least two things, namely: (i) efficiency (production) aspect; and (ii) the marketing aspect.

In general, business efficiency can be calculated from the ratio between the amount of revenue with costs incurred for the production, using the R / C ratio or Return Cost Ratio. In the calculation of the analysis, preferably R / C is divided into two, namely R / C that uses the real costs and R / C which calculate all the costs, both real costs and expenses incurred that are not real excluded. Mathematically it can be formulated as follows (Soekartawi, 1995):

$$\text{Efficiency} \quad : \quad \frac{R}{C}$$

Explanation :

R : Revenue (Rupiah)

C : Total Cost (Rupiah)

The criteria used in determining the efficiency are:

R/C > 1 : business run efficiently

R/C = 1 : business run in Break Event Point

R/C < 1 : business run inefficiently

Furthermore, marketing is a commodity flow process that accompanied by the ownership transfer, place and form conducted by marketing institution to carry out one or more of the marketing function. To understand the complexity of commodity

marketing some approach can be used namely: (i) commodity approach; (ii) institutional approach; (iii) functional approach; (iv) economic approach; and (v) a systems approach (Sudiyono, 2002).

## **2.2. Agro-Industry Development Strategy Through Farmer Empowerment**

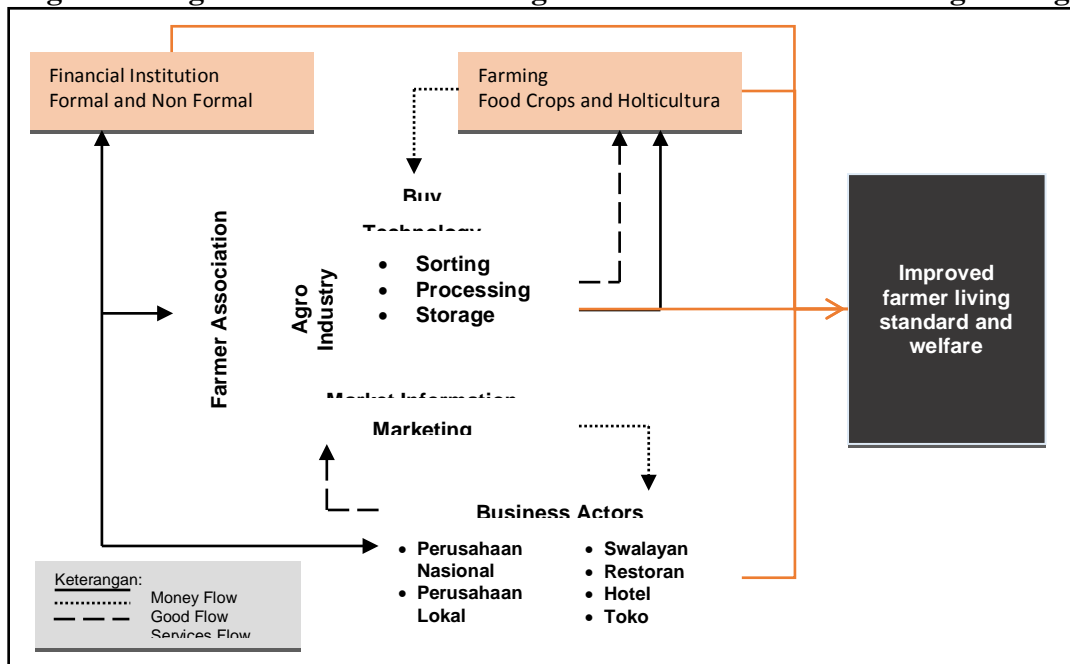
Agro-industry as an industry that process agricultural products, or companies that process the material derived from plant) or derived or produced by animals. Process applied includes the conversion and preservation through physical or chemical treatment, storage, packaging, and distribution (Austin, 1971).

Wibowo (1997) suggests the need for the development of agro-industries in rural areas through the institutional farmers by paying attention to the basic principles, including: (i) stimulate competitive advantage products / commodities as well as comparative advantage in each region; (ii) accelerating human resources improvement and grow appropriate agro-industry that able to develop in each region; (iii) expand the area of agribusiness centers especially in leading commodity which serve as the sustainable raw material; (iv) spur the growth of agri-region by presenting agribusiness subsystem; and (v) present a variety supporting medium in the development of rural agro-industry. Therefore, farmers as agribusiness subsystem actors have a very important role in the development of agribusiness model.

Figure 03 describes the development of the agribusiness model in accordance with the purpose of strengthening farmer's institution. An agro-industry model that able to increase employment opportunities and income of farmers are needed. Therefore, the formulation of agricultural development planning needs to be tailored to the characteristics of the region and the availability of appropriate technology. It is intended so that the allocation of resources and limited funds can produce optimal output, which in turn will have a positive impact on the welfare of the people, especially farmers.

In order for the agro-industry to act as a major driver of agricultural development, the farmers institutional-based rural industrialization must meet the following conditions, namely: (i) located in the countryside; (ii) integrated vertically down; (iii) the input-output relation with other industries has to be great; (iv) owned by villagers; (v) labor-intensive; (vi) labor is from the village; (vii) the production of raw materials is from the village; and (viii) the resulting product is mainly consumed also by the villagers. (Simatupang and A Purwoto, 1990) in Supriyati and Erma Suryani (2006)

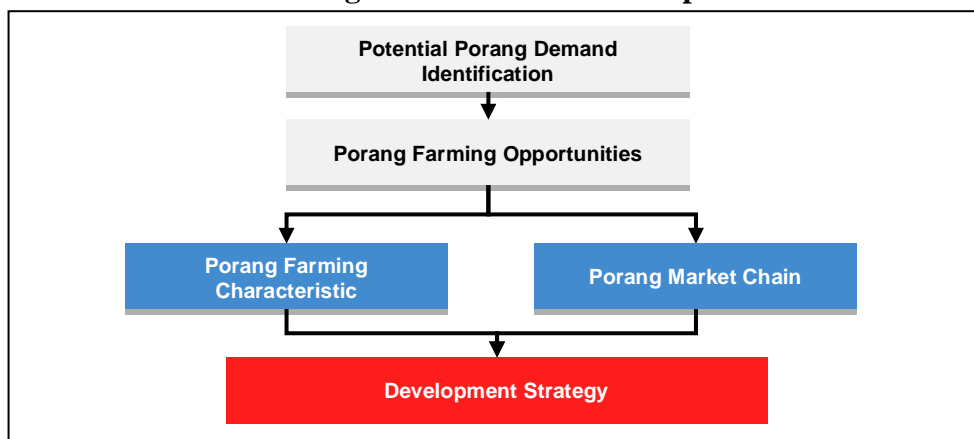
**Figure 03. Agribusiness Model Through Farmers Institutional Strengthening**



Source: Syahza, 2007

Based on the three theories of governance strategies of farming, agro-industry development strategy based SMEs and empowerment of farmers, the conceptual framework of research to identify how to optimize Porang Glucomannan cultivation business opportunities through SMEs in East Java can be seen as Figure 04.

**Figure 04. Research Concept**



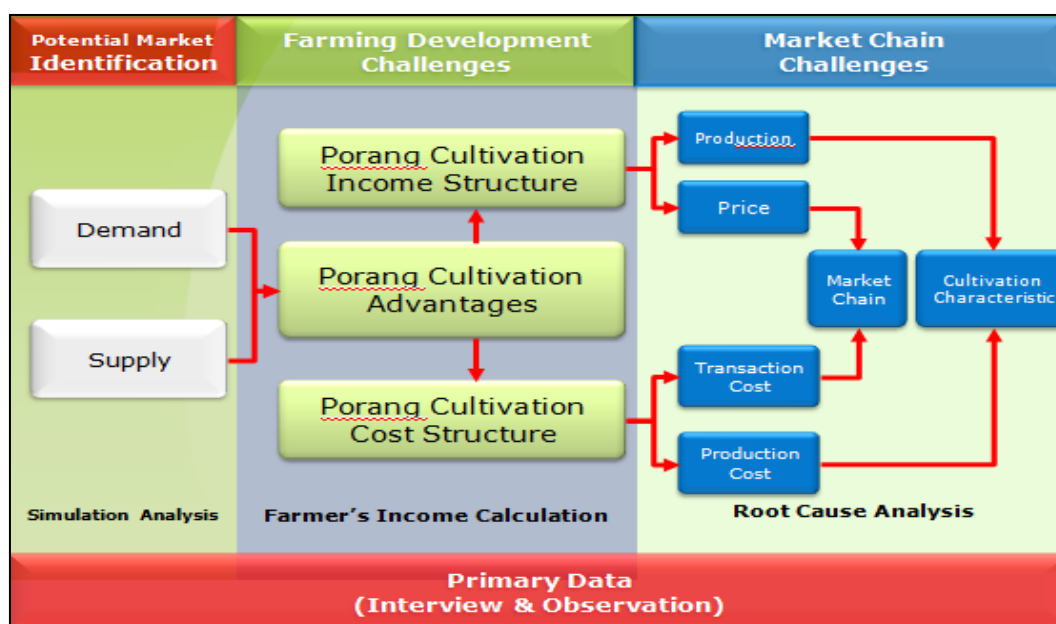
Source: writer illustration, 2014

### 3. METHODS

To answer the purpose of this research and operationalize the concept of research, the method in this study consists of two kinds, namely: (i) descriptive and (ii) exploratory research. This study begins with an evaluation of current conditions (existing condition) regarding the Porang cultivation and market chain in East Java. Furthermore, the evaluation results can be used to formulate Porang development strategy based on SMEs. The evaluation includes three phases, namely: (i)

identification of the potential demand for farmed Porang from the demand and supply sides based on simulation analysis techniques. (ii) Porang development challenges in optimizing the potential market demand. Where, the steps taken are identifying the problems in Porang cultivation by looking at the characteristics of Porang plant, the cost, and the revenue structure of farming. (iii) The identification of problems in market chain based on the distribution chain and the level of revenue sharing for each actor in the Porang trade chain system.

**Figure 05. Research Steps and Method**



Source: writer illustration, 2014

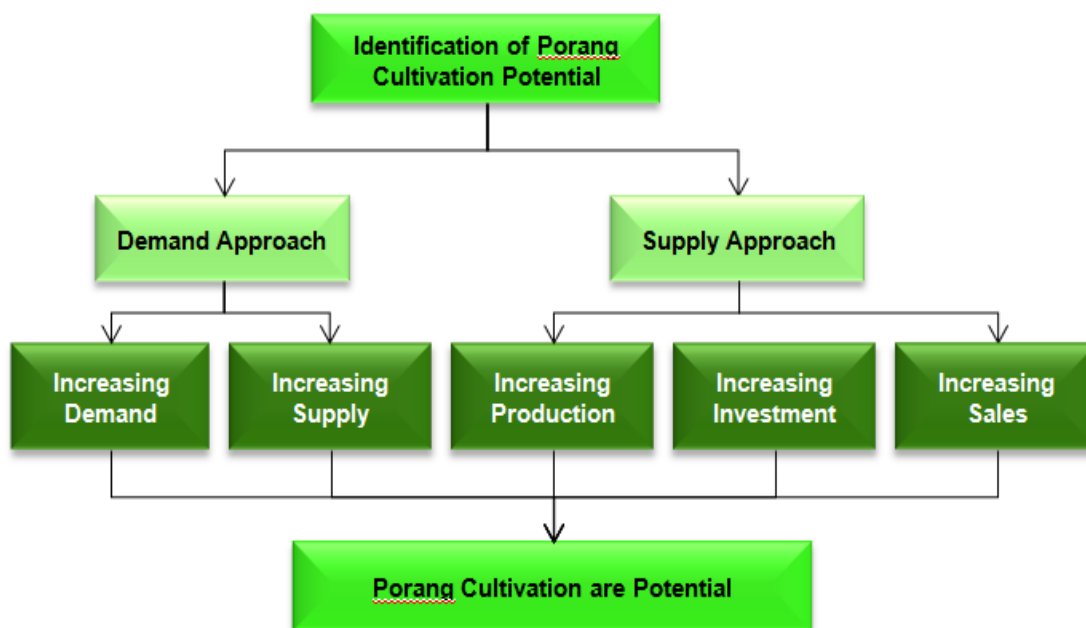
## 4. RESULTS AND DISCUSSION

### 4.1 Porang Business Potential in East Java

The potential for cultivation can be translated into opportunities or business opportunities owned by farmers, so that the commodity planted can be absorbed by markets. Therefore, the potential for cultivation of Porang can be estimated using two approaches, namely:

1. Demand Approach with emphasis on two aspects, namely: (i) Porang demand development, and (ii) the trend of increased prices. If the increase in demand cannot be offset by an increase in production, the price tends to rise. This condition indicates that the market is experiencing a situation of scarcity or can be regarded as a growing business opportunity.
2. Supply approach with emphasis on three aspects, namely: (i) a tendency to increase production; (ii) increased investment; and (iii) an increase in sales. If farmers feel the increase in sales, then the farmers will increase the production and investment. This condition reflects that the market opportunity is large enough

**Figure 06. Identification of Potential Porang Cultivation**



Source: writer illustration, 2014

Figure 06 illustrates the approach used to identify potential Porang cultivation. Information on the development of demand and supply obtained from interviews with farmers. If it turns out the farmers stated that both of the price and sales aspects are likely to increase, it can be said that Porang cultivation has huge potential. The results of the analysis can be divided into two main discussion, namely: (i) potential Porang cultivation estimates based on demand approach and (ii) based on supply approach.

Based on demand approach, the potential of Porang cultivation can be considered as very high. This is indicated by the tendency of increase in prices, the number of traders and the number of industries (Table 01).

**Table 01. Potential Market Opportunities Based on Demand Approach**

Categories	Price Increase	Traders Increase	Industry Increase
Low	5%-10% (40% sample)	Increase in Number of Traders (in the last 10 years) are 5 traders.	Increase in Number of Industry (in the last 10 years) are 3 Industry.
Medium	11%-20% (30% sample)		
High	21%-38% (30% sample)		

Source: Primary Data Analysis, 2014

Meanwhile, the supply approach also shows that the market opportunity is quite high. This is indicated by an increase in sales, investment, and production that can be seen in Table 02.

**Table 02. Potential Market Opportunities Based on Supply Approach**

Categories	Sales Increase (turnovers)	Investment Increase	Production Increase
Low	7%-10% (15% sample)	Increase in the Land Occur Each Year	Increase in the production occur in 2009-2011, but tends to stagnate in 2012-2013
Medium	11%-38% (77% sample)		
High	39%-56% (8% sample)		

Source: Primary Data Analysis, 2014

#### 4.2 Market Potential and Challenges

Exposure based on the preceding discussion, the cultivation of Porang still has great potential, in terms of demand and supply approach. However, the development of Porang cultivation is not running smoothly without a hitch. The quality of the crop is not maximized, the instability of Porang development pattern, and production processes that still traditional is few from the many challenges of Porang development in the study area. Therefore, the utilization of the market potential of Porang cultivation have to go through the identification of problems which then can be Porang development challenges ahead. This challenge is based on two aspects, namely:

1. Production increase aspects, which in this case is to see the challenge from the Porang cultivation characteristics. The difficulty can be seen by some emphasis, namely: (i) an overview at the farm level; (ii) an overview of business actors; and (iii) a description of the environmental factors. From this third overview, the business investment can be analyzed, which include: (i) the capital factor; (ii) infrastructure; (iii) technology; and (iv) the availability of human resources.
2. Porang market chain aspects, which focused on the characteristics and problems in the market chain, especially from the aspect of the selling price and transaction costs. The goal in this case is to look at the characteristics of the Porang market chain and farmers position in the distribution chain.

In improving Porang cultivation there are some problems that have been experienced by farmers, namely: (i) the characteristics of the plant and its implications Porang cultivation, and (ii) the cost and revenue structure. Porang have different characteristics with other farm crops. Porang characteristic can be divided into four. **First**, growing conditions, plant Porang (*Amorphophallus Onchophyllus*) is a shrub that has a height of 100-150 cm, erect stems, soft, smooth stems, usually by the color green or black with white streaks. When harvesting, the farmer will can choose the bulbs which are fit for sale or allocated as seed. In order to become a commodity that can be sold immediately, it takes 1-2 years. Thus the early stage of the harvest cycle is quite long.

**Second**, the level of productivity, Porang can be propagated vegetatively and generative (seed/bulbils). Seed is selected from healthy bulbs and bulbils. Which, only need to be planted once. The seed need per unit area depends on the type of seed used and plant spacing. Generally, the cost of Porang maintenance for farmers is very low,

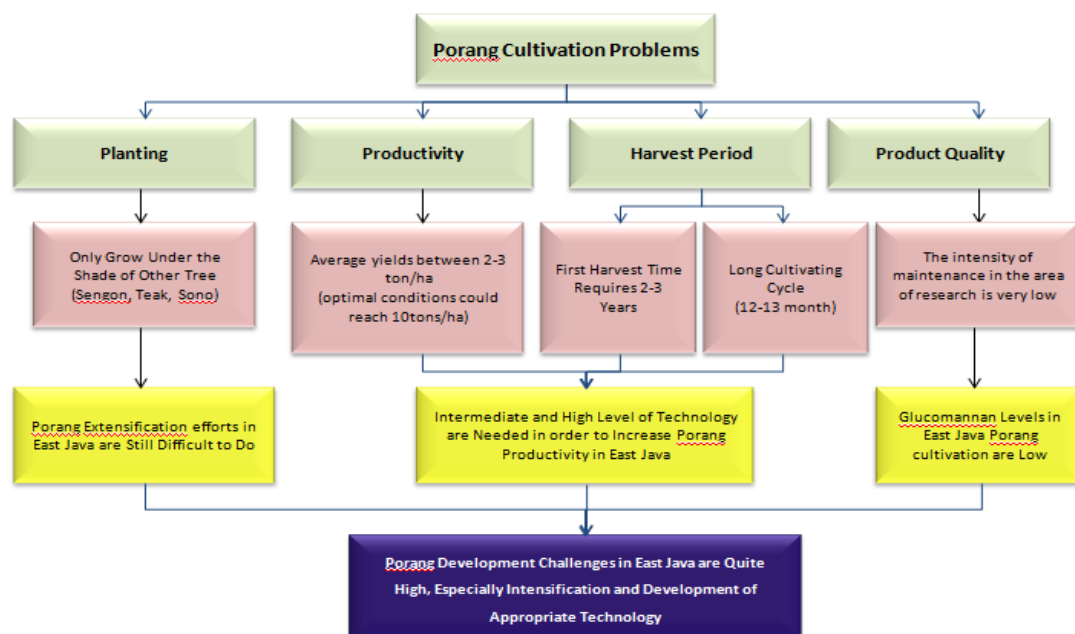


but the productivity level is not too high. Thus, the Porang productivity level depending on the land area.

**Third**, Harvest Period, Porang plants can be harvested for the first time after the 3 years. After that, the plant can be harvested once a year without having to replant the seed. Although it does not require re-seed (after 3 years, but it remains that the harvest waiting period is fairly long.

**Fourth**, Product Quality, Porang plant is a plant that requires special maintenance. If not treated optimally, then the glucomannan levels will be very low. To get the maximum growth and production, intensive treatment can be done, such as: (i) clearing weeds that may be competitors in terms of the need for water and nutrients; (ii) fertilization, which is done when first planted as basic fertilization; and for subsequent fertilization can be done once a year (by the beginning of the rainy season).

**Figure 07. Porang Development Challenges in East Java**



*Source: Primary Data Analysis, 2014*

Furthermore, in addition to the challenges associated with Porang characteristics, there are other challenges Porang improvement, namely the issue of the cost and revenue structure. In the process the product yields, Porang farmers can be divided into two types, namely:

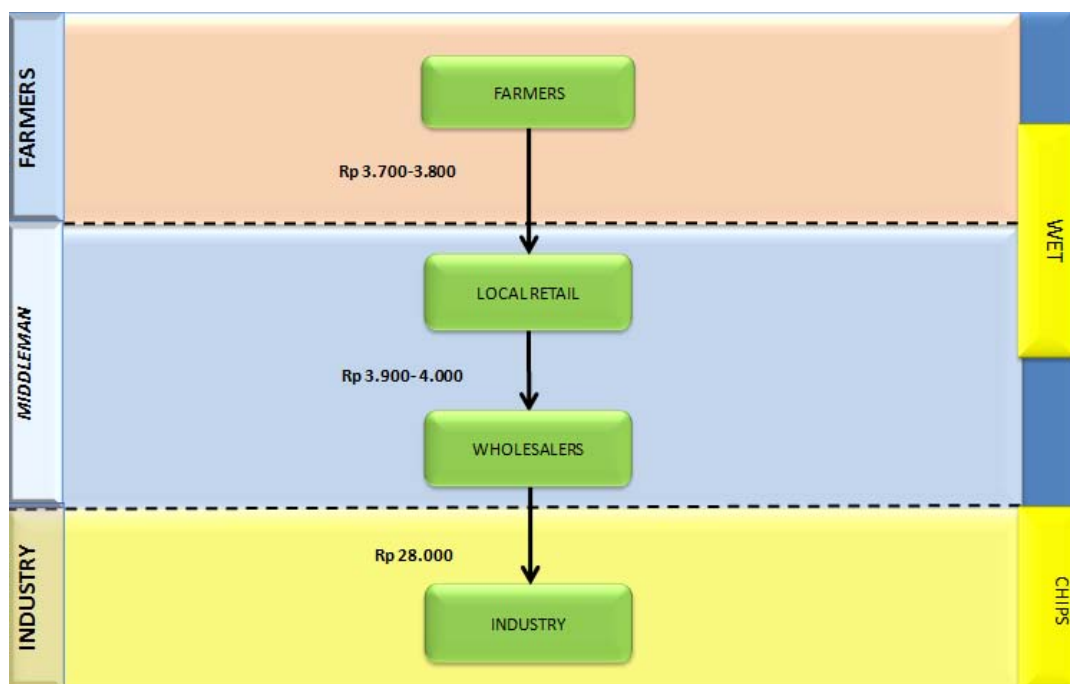
1. The first type is a farmer who sells Porang Porang in wet form to collectors.
2. The second type is a farmer who sells Porang Porang in the form of chips.

Based on field findings, the majority of farmers are farmers who sell Porang in the first type. There is a reluctance to treat Porang into chips. In general, farmers sell only in the form of wet low resale value. The selling price of wet Porang only around Rp 3700-4000 while to dry Porang reach Rp 28,000 (the price difference between dry and wet Porang due to the high percentage of Porang shrinkage which reached 83%, meaning that for 100 kg Porang only able to produce 17 kg of dry Porang). The

reluctance to process into a chips caused by the length of the drying process and limited land (for drying process) owned by farmers.

Next is the challenge of Porang trading systems. Figure 08 shows the flow of Porang market chain which having implications for price developments in each actors. This implication signifies challenge in Porang market chain because they indicate the high inequality in income level. This inequality can be seen from the results obtained by farmers and the results obtained by merchants, both locally or as wholesalers. Figure 08 explicitly reflects the dominance of the intermediate agent (middleman) in Porang trade. Although when compared with the number of small traders the wholesalers are actually very little in quantity, but the accessibility of information and market makes the network and bargaining position of wholesalers is far higher. In addition, due to lack of knowledge of farmers, structural position and proximity factor with stakeholders such as Forestry Ministry can be one of the low network and bargaining position cause. From the field study, there is an indication that some of the large trader concurrently in an important position such as the chairman of LMDH (Institute of Forest Village Community).

**Figure08. Porang Market Chain Challenge in East Java**



*Source: Primary Data Analysis, 2014*

As stated before, there is a reluctance to treat Porang into chips. This is due to produce Porang into chips, required extensive drying area and additional manpower. Which make the inequality in income grow larger.

In addition, the risk of Porang business cannot be separated from environmental characteristics of Porang market chain, which can be divided into three classifications, namely:

1. Demographic conditions, which related to the lack of education of Porang farmers. As a result, farmers often forgot the knowledge of the market price, in addition to

technology and innovation planting are less compromise with the latest innovations. So Porang productivity remains the same from year to year.

2. Institutional governance, namely the uncertainty in government level management, resulting in a low concern from the government. Porang often grown on land owned by Perhutani (production forests) and private forests (which is the region of the Forest Misnistry), resulting in overlapping of policies and authorities in handling Porang. As a result, the policy developments in Porang are not maximal. While in the level of farmers, the farmers groups in the form of village institutions (LMDH) have not been able to run optimally as a medium for farmers in obtaining information or knowledge in farming.

3. Cultivation characteristic, where the problem lays on the different characteristics of Porang with other agricultural commodities. Which, forest type affects the productivity of Porang. If Porang planted on land that has dry characteristics (such as teak), it produces Porang with low water content, while on land that tend to be wet (non-production forest) it produces Porang with high water content. This will affect the shrinkage Porang when processed into chips. On the other hand forests tend to be isolated. These characteristics result in a lack of access to information and technology on productive farming for farmers.

Those three problems resulted in low productivity and network of farmers to access information technology that supports productivity. The implication, trade regulation mechanism is also not so maximal.

### 4.3 Porang Development Strategy

Based on the analysis of potential market opportunities, Porang business are very feasible to develop. However, the existence of several barriers to Porang development, required a development strategy, which is aimed to attract investors, with the farmers institutional improvements. One of the solutions that can be used for development strategy are contract farming.

Contract farming is an agricultural production system that requires agreement on production and marketing cooperation between buyers (industry) and sellers (farmers). Based on the experience of several countries, as reported by FAO (2009) which states that contract farming can reduce the risk of agricultural cultivation. This is because, contract farming can reduce failure risk for farmers in selling their products. Although the prices received by farmers usually are not as high as when the market are having scarcity. Besides, contract farming is needed by the industry to ensure the security of raw materials supply. So the purchase of raw materials tends to be stable. However, involvement in contract farming industry led to the emergence of additional costs (transaction costs) in the form of the cost of supervision and negotiation costs. Thus, basically contract farming are the embodiment of the two interests (ie: industry and farmers) which is mutually beneficial.

In the business world, there are five models of contract farming (Dawes, et.al, 2009), namely:

1. **Centralized Model**, which acts as a buyer of industrial processing that determines the quality standards of agricultural products.
2. **Nucleus Estate model**, which is a specific form of centralized model that is implemented on the plantation.

3. **Multipartite models**, namely the development of a centralized and nucleus models. This model involves more than one organization in contracting with farmers.

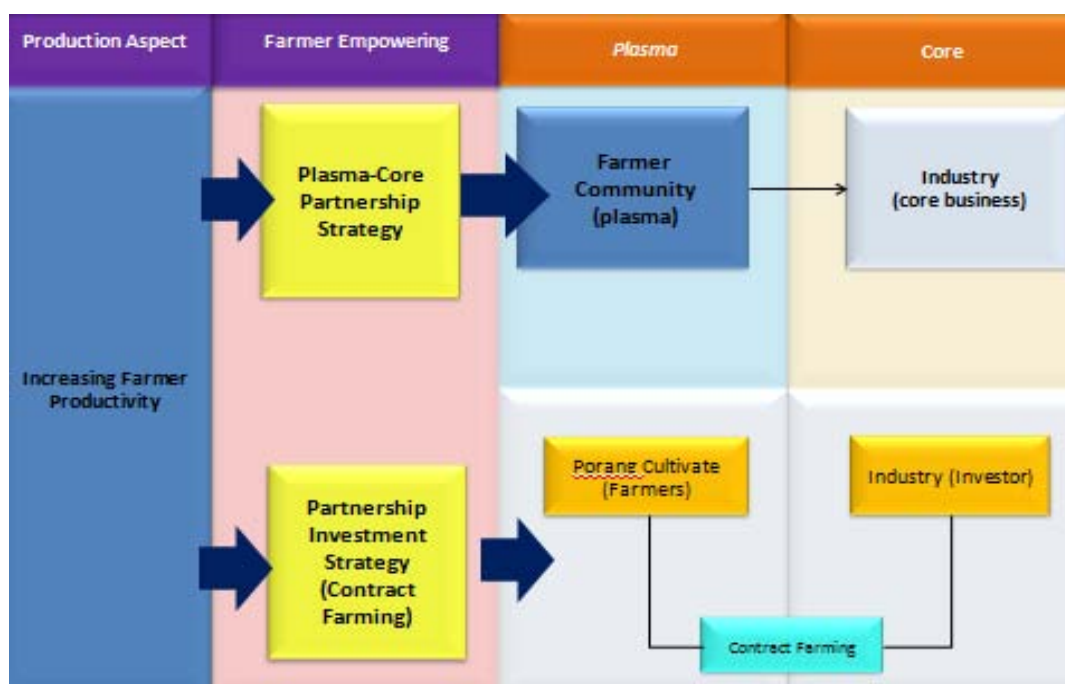
4. **Informal models**, the contract can be shaped in centralized, multipartite, or nucleus estate models. However, this model does not use the formal contract.

5. **Intermediary model**, this model is almost similar to the multipartite models, but the processing industry does not deal directly with the farmers. So that the processing industry is paying other groups as intermediary organizations in fostering farmer.

Porang business in East Java today is actually an intermediary contract farming which does not use a formal contract. Traders and merchants are act as intermediaries who provide capital assistance to farmers obtained from the industry. This is done by the industry to maintain the security of supply of Porang as raw materials. Based on the research results, this model gives a greater profits to middlemen compared to farmers.

Given the characteristics of the market structure is not perfect, the recommended strategy is contract farming with multipartite models that are developed based on the nucleus and centralistic model. Which are not too different with intermediary model. Multipartite development models require two main requirements, namely: (i) the formation of farmer communities or groups, and (ii) the existence of investors in the processing industry which may increase the value added before being sold to the industry that uses Porang as raw materials as pictured by Figure 09

**Figure 09. Farmer Empowerment Effort**



Source: Primary Data Analysis, 2014

## 5. CONCLUSIONS

There are three conclusions from this study, namely :

1. Porang in East Java can be called as a high value added commodity. However, the fact that increasing farmer income is very slow.

2. Market structure of Porang in East Java tend to be monopolized. Where Porang farmers have a low bargaining position. That is why there is an anomaly phenomenon between increasing porang sales and farmer income.
3. The empowering of Porang farmers should be done if we want to increase farmers income occur.

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