FACTOR ANALYSIS OF STANDARD OPERATING PROCEDURES (SOP) AND THE DIFFUSION PROCESS FOR BANANA FARM:
(A Case Study in Cianjur District, West Java, Indonesia)

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CHAPTER I

INTRODUCTION

1.1. Research Background

Everyday, million of people around the world eat only the bare minimum of food to keep themselves alive. Every night, they go to bed not certain whether there will be enough food to eat tomorrow (FAO, 2010). FAO had reported in 2009 that 1.02 billion people worldwide are undernourished. This number increased after the recent financial crisis; this number was recorded to be higher than it was 40 years ago, and before the hunger reduction target was met. If an individual's calorie intake is lower than the minimum dietary requirement, he or she may become undernourished.

The majority of the world's undernourished people live in developing. Two-thirds live in just seven countries (Bangladesh, China, the Democratic Republic of the Congo, Ethiopia, India, Indonesia, and Pakistan). Furthermore, people tend to shift expenditures towards cheaper, calorie-rich, energy-dense foods such as grains, and away from more expensive protein and nutrient-rich foods such as meat, dairy products, or fruits and vegetables (FAO, 2010).

Despite the availability of food, poverty limits food access, because nutritious food is unaffordable. The food prices have doubled in the last 20 years. The World Bank has also warned that the rising food prices are pushing millions of people into extreme poverty. In April, it is said food prices were 36% level of a year ago (BBC News, 2011). Consequently, owing to their low income, many poor lose their right to access food. Ideally, every person has the

right to access food, not only to prevent hunger, but also to ensure health and well-being. "In protecting and promoting livelihood, it is important to pay attention to what the people are doing and how to support their efforts" (FAO, 2010).

In Indonesia, 64.22% of the poor live in rural areas (Statistics Indonesia, 2009). The Lack of assets, access to services, technology, market; skill training, and organizational support are factors that determine rural poverty. Farming has been considered the major occupation of rural households, particularly the poor households. Limited land, water, and capital are the problems common to the rural poor. The lack of services hinders their access to new technologies and markets. Limited skills and knowledge undermine their efforts to improve their agricultural productivity, food security, and income. The lack of organizational support prevents them from thriving in the marketplace, limits their access to services, thereby making them vulnerable to the injustices that force them into poverty (Carletto, et al., 2007).

While in fact, Indonesia's developing agriculture sector has a high potential. Not only does Indonesia have a reserve of rich natural resources, but also around 70% of its total population works in the agricultural sector. The cultivation of fruits, which are horticultural products, seems like a very promising sector. According to the data provided by the Ministry of Agriculture, farmer receives a higher value change on fruit than on other agricultural products. The comparison of farmers' value change for fruits and that for average agricultural products is shown in Table 1. For a farmer, value change refers to the purchasing power required in order to convert agricultural products into consumable goods and

services; therefore a farmer believes that it assumes that fruit produces can generate more income than other agricultural products.

Table 1. Value change for a farmer

Year	Value change for average agricultural products	Value change for fruit products
2003	125.6	136.7
2004	109.3	144.6
2005	106.7	135.5
2006	108.3	130.3

The amount of fruit production increases each year; the banana has the highest proportion in the total national fruit production. In 2009, banana production was 6,373,533 tons. This accounted for 34.16% of the national fruit production at 18,653,900 tons. The harvest area and production volume of bananas Indonesia are shown in Table 2. In the addition, according to the agricultural census data of 2003, 16,038,686 households cultivate bananas.

There are several factors support the development of banana cultivation in Indonesia. First, bananas can be planted in many types of agroecosystems, which are scattered across Indonesia. Second, there exist a high market demand and greater availability of bananas throughout the year. Finally, the banana agribusiness could generate a high profit in the short term (1-2 years).

Table 2. Harvest area and production volume of bananas in Indonesia

Year	Harvest Area (ha)	Production Volume (ton)
1999	70,513	3,375,851
2000	73,539	3,746,422

2001	76,923	4,300,422
2002	74,751	4,384,384
2003	85,690	4,177,155
2004	95,434	4,874,439
2005	101,465	5,177,608
2006	94,144	5,037,473
2007	98,143	5,454,226
2008	107,791	6,004,615
2009	119,018	6,373,533

(Source: Ministry of Agriculture, 2010)

Unfortunately, the high production of bananas does not ensure a high-quality produce. Several factors hinder banana development in Indonesia. First, the banana farms do not constitute the main share of farmers' crops in Indonesia. Usually, bananas are cultivated along the boundary of the farmers' lands or in the house yard and are often abandoned. Second, most of the farmers have only a small plots of around 0,1 ha – 0,25 ha. Third, the farmers have limited knowledge about production and post-harvest technology. Fourth, the banana market chain is long; therefore, farmers receive only a small profit margin. Fifth, a weak organizational support for the farmers weakens their bargaining position. Therefore, most farmers sell their products to the brokers at a low price. Sixth, the much needed financial support has not yet been made available to these farmers.

The main problem in banana cultivation is the negative cycle of banana development. Banana farmers often tend to abandon their banana plants. Since bananas could grow well even with low maintenance, the farmers hardly work on their banana plants, they only nurture their plants to harvest the fruit. Therefore, most of the banana produce is of low quality and sells at a low price; this discourages the farmers from investing greater efforts in cultivating bananas.

They tend to believe that even though they work hard on their banana plants, the price of their produce remains low owing to their weak bargaining power.

In order to break the negative cycle of banana development, the government has introduced an SOP (Standard Operating Procedures). SOP is a new method in cultivating banana. By applying the SOP, the quality of the harvest could be enhanced in order to increase its selling price. A higher selling price will encourage the banana farmers to cultivate their banana plants better. The SOP was adopted from the standard cultivation method of a large private company in Indonesia. The government insists on the creation of similar standard cultivation methods for each fruit in the production center.

In order to create the new SOP, the central government, local government (provincial and district level), representatives of the farmers, and traders, and researchers worked together. Every SOP is specific to the location of its application; the SOP for one area might be different from that for another. Therefore, farmers' experience and researchers' knowledge are needed in order to create an ideal standard cultivation method. The researchers involved in the creation of SOP are usually from the universities.

The SOP is a standard method for any production process, which contains information and detailed instructions regarding both cultivation and post-harvest processes. Detailed instructions for the SOP of banana cultivation are illustrated in the figure below. The SOP is introduced to the farmers after its creation. Initially, government officials visit the banana farms, meet the farmers, introduce the SOP to them, and conduct the field practice. The local extension worker is responsible for the further education of the farmers; each village is assigned one local extension worker.

The detailed instructions for the SOP

- Land and seed preparation
- Planting
- Fertilizing
- Irrigation
- Thinning of young plants
- Fruit wrapping
- Cutting of the banana heart
- Pest and disease control
- Harvesting
- Ripening process
- Post-harvest

Figure 1. The SOP of banana cultivation

The SOP introduction could be a mean in the farmer empowerment, since according to IFAD (2007), farmer empowerment could be done by promoting the development and dissemination of new agricultural technologies. At this term, SOP is a new agricultural technology. Though in the implementation, SOP adoption is still facing many problems. First is that, the farmers who adopt the SOP ought to replant new seeds in their lands, and they need money to purchase seeds, fertilizers, and other production inputs. Hence, most farmers are hesitant to adopt the SOP because they do not have sufficient capital to renew their lands. Another problem concerning the adoption of SOP is that, the banana farmers hold a weak bargaining position in the market. Hence, they

continue to sell their products at a low price even after they have adopted the SOP. This could discourage the SOP adoption, because the farmers do not enjoy the benefits of SOP.

The successful of the SOP program depends on the farmer participation in adopting SOP. Therefore determining the factors that influence the diffusion process of SOP is important, because they play a crucial role in the promoting the benefit of SOP, thus guaranteeing the success of the SOP program.

1.2. Research Questions

Introducing a new technology to farmers is not an easy task. Farmers tend to have a low participation in the government programs. Therefore, such programs fail to help the farmers overcome their problems or do not significantly impact the farmers.

From a rational perspective, farmers decide to adopt a technology on the basis of the perceived advantages the technology is presumed to bring. A technology that is proven to be better or superior to a conventionally used technology will, be accepted and adopted easily (Yokoyama, et all, 2009).

Therefore, this research comes with the questions of:

1. What is the variable that influences the farmers in adopting the SOP?
2. Does the SOP give impact to the better income of the farmers?

1.3. Research Objectives

The objectives of this research are as follows: (1) to determine the factors that influence a farmer's decision regarding the adoption of the standard operating

procedure (SOP) of banana cultivation, and (2) to estimate the impact of the application of the SOP.

1.4. Research Benefit

This research will give benefit to both practical and theoretical.

1.4.1 Practical Benefit

This research will practically support the government program to increase the quality of fruit products and empower the farmers.

1.4.2. Theoretical Benefit

Theoretically, it will give input to the development theory on how to assist the empowerment of people by diffusing a new technology on agriculture as its sample.

CHAPTER II
THEORETICAL FRAMEWORK

2.1. Prior Research

According to Yokoyama et all (2009), who studied the diffusion process of a water-saving irrigation technology in Philippines, the people with good social relations are considered reliable and influential. Hence, farmers who have good relations with other farmers, government officials, and external agents are most likely to adopt a new technology; this way, a new technology becomes easily accessible to such farmers

While Janvry and Qaim (2003) who studied the adoption of genetically modified cotton and its impact in Argentina, stated that farmers owning larger lands tend to adopt a new technology as it significantly increases their yields. The use of technology ensures a more intensive cultivation process that produces a higher yield. Therefore the farmers owning larger lands tend to maximize the potency of their lands to increase productivity and income.

2.2. Applied Theory

2.2.1. Development Theory

The International Labor Organization (ILO) has introduced the concept of 'basic needs', which are (1) basic of personal consumption – food, shelter, clothing; (2) access to essential services – clean water, sanitation, education, transport, healthcare; (3) access to paid employment; (4) qualitative needs – healthy and safe environment, ability to participate in decision making (Hunt, 1989; 265-6 in Willis, 2005; 94).

Based on this concept, the focus of development policies was to be directly at the poorest people in the society. Meeting the needs of the poor would both help reducing poverty levels and improve the education and skill level of the population, which will give contribution to greater economic growth. Since, if the poor get richer, they will give more contribution to the increased demand of domestic consumption (Willis, 2005; 94-95).

According to Sen (1999), development requires the removal of major sources of unfreedom: poverty, poor economic opportunities, and neglect of public facilities. Rowland (1997,1998) in Willis (2005; 102) stated that empowerment has become one of the key buzzwords in development policy. While Willis (2005; 102) added that empowerment could be said as the development outcome, and the key routes through which empowerment is meant to be achieved is through participation.

2.2.2. Decision Making Theory

Dill (1972) in Islamy (2004) said decision is a choice among alternatives. The decision making process is a process in which choices are made to change (or leave unchanged) an existing condition, to select a course of action most appropriate to achieving a desired objective, and to minimize risks, uncertainty, and resource expenditures in pursuing the objective.

Nigro and Nigro (1980) in Islamy (2004) explained the influencing factors of decision making process which are: external factor, conservatism, personal character, external group influence, and old past

habit. Beside those factor, there are also several difficulties in making decision, which are: the lack of information, different interest, and upredictable decision impact (Caiden, 1971 in Islamy, 2004). Anderson (1979) in Islamy (2004) revealed that there are several values that influence the attitude of decision maker which are: the political value, organization value; personal value; policy value, and ideological value.

According to Yehezkel Dror (1968) in Islamy (2004), there are seven decision making models, one of them is the rational model. This model is based on people as a rational human. According to this model, people know the consequences of alternatives among choices, and rationally they will make the decision to get the highest advantage.

2.2.3. Diffusion Theory

According to Rogers (2003, p: 5), diffusion is the process in which an innovation is communicated through certain channels over time along the members of a social system. It is a special type of communication, in that the messages are concerned with new ideas. While communication is a process in which participants create and share information with one another in order to reach a mutual understanding. Therefore communication is a process of convergence as two or more individuals exchange information in order to move toward each other (or apart) in the meanings that they give to certain events.

Rogers (2003, p: 6) added that diffusion is a special type of communication in which the messages are about a new idea. Thus, this newness of the idea in the message content gives diffusion its special

character, since some degree of uncertainty is involved in diffusion. When new ideas are invented, diffused, and adopted or rejected, it will lead to certain consequences, social change.

Rogers (2003, p: 11) stated about four main elements in the diffusion of innovations, which are innovation, communication, time, and social system. The social system constitutes a boundary within which an innovation diffuses.

According to Rogers (2003, p: 37), a system has structure, defined as the patterned arrangements of the units in a system. The social and communication structure of a system facilitates or impedes the diffusion of innovations in the system.

Rogers (2003, p: 38) also believed that there are three main types of innovation-decissions, which are: (1) optional innovation-decisions, choices to adopt or reject an innovation that are made by an individual independent of the decision of other members of the system; (2) collective innovation-decisions, choices to adopt or reject an innovation that are made by consensus among the members of the system; and (3) authority innovation-decisions, choices to adopt or reject an innovation that are made by relatively few individuals in a system who posses power, status, or technical expertise. A final way in which a social system influences diffusion concerns consequences, the changes that occur to an individual or a social system as a result of the adoption or rejection of an innovation.

It is also mentioned by Rogers (2003, p: 216) that the innovation – decision process, process through which an individual (or other decision

making unit) passes from first knowledge of an innovation to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision, consists of five stages, which are: (1) knowledge, when the individual is exposed to the innovation's existence and gains an understanding of how it functions; (2)persuasion, when the individual forms a favorable or unfavorable attitude toward the innovation; (3) decision, when the individual engages in activities that lead to a choice to adopt or reject the innovation; (4) implementation, when the individual puts an innovation into use, and (5) confirmation, when the individual seeks reinforcement for an innovation-decision already made but may reverse the decision if exposed to conflicting messages about it.

CHAPTER III
RESEARCH METHOD

3.1. Research Location

This research was conducted in Cianjur District, West Java Province. Cianjur is located in the Bopunjur area (Bogor-Puncak-Cianjur) on the intersection between of Jakarta, the capital city of Indonesia, and Bandung, the capital city of West Java. The total area of Cianjur is 350,148 ha,which is divided into 32 sub-districts, and 67% of the total area is agricultural land.

Cianjur District is located at 100–1.799 mdpl, and has a temperature of around 19^{o} C– 32^{o} C. The average range of rainfall is 19 mm/year – 33 mm/year, and that of humidity is 4.12% – 13.07%. The soil types are alluvial, latosol, andosol, and regosol, with a pH of 3.5 - 7.

The total population is 2,138,465, and 52% of the population is engaged in the agricultural sector. Unfortunately, 30% of Cianjur's population is defined as poor, and most of the poor are smallholder farmers and farm laborers. In 2005, it was reported that at least 22,027 children (12.6% of the total children aged 5 and below) in Cianjur lack nutrition, and 1.4% of them are malnourished (2,411 children). Moreover 97 children are severely malnourished (Tempo, 2005). Berita Indonesia (2007) revealed that around 400 people in 3 villages in the Agrabinta sub-district, Cianjur, were victims of severe hunger, since they could not afford to buy rice. They survived by

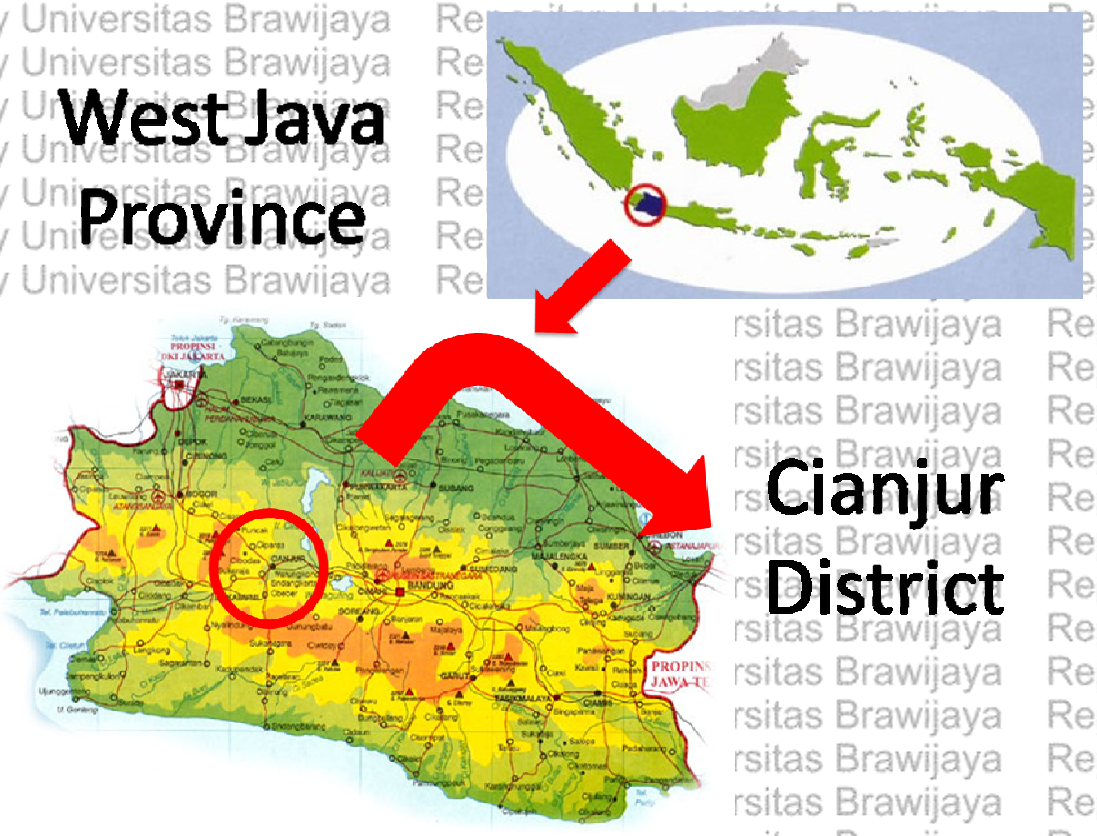

Figure 2. Location of Cianjur District

consuming coconuts for around a month, and some could eat only once in three days. Sukamanah, a village in another sub-district, Cibinong, which is home to around 200 households that survived on only could only eat oyek (drying cassava). The vice of the Cianjur Health Office stated that in 2008 among 200,000 children, aged 5 and below, 890 were malnourished (Pelita, 2011). One of the victims, Ilham, could gain only 5 kg body weight, when the normal weight should have been 12 kg.

The above mentioned statistics provide a clearer picture of the food insecurity in Cianjur. Most victims of hunger include the poor engaged in the

agricultural sector, who could not afford to fulfill their basic need for food. Many of them got just enough food to survive, without considering nutrition and calorie requirements. Therefore, it is highly necessary that they receive support to increase their income, so that they can afford the amount of food required to be well-nourished.

Meanwhile, Cianjur is the highest banana producer in Indonesia. The banana production volume in Cianjur District is shown in Table 3 below.

Table 3. Banana production volume in Cianjur District

Year	Production (kw)
2004	6,224,721
2005	5,912,035
2006	8,686,888
2007	9,460,690
2008	10,291,697

Source: Agriculture Office of Cianjur Regency

Cianjur has 87,550 banana farmers. The suitable climate and favorable geographical conditions support the healthy grown of bananas in Cianjur. In Cianjur, 67,335 ha of land are used for banana cultivation; however, the potency of the land needs to be developed further, since 59,086 ha of the area is suitable for banana development. The banana production centers in Cianjur are spread over 9 sub-districts: Cugenang, Gekbrong, Sukaresmi, Cikalong Kulon, Cibeber, Cibinong, Cidaun, Sindangbarang and Agrabinta.

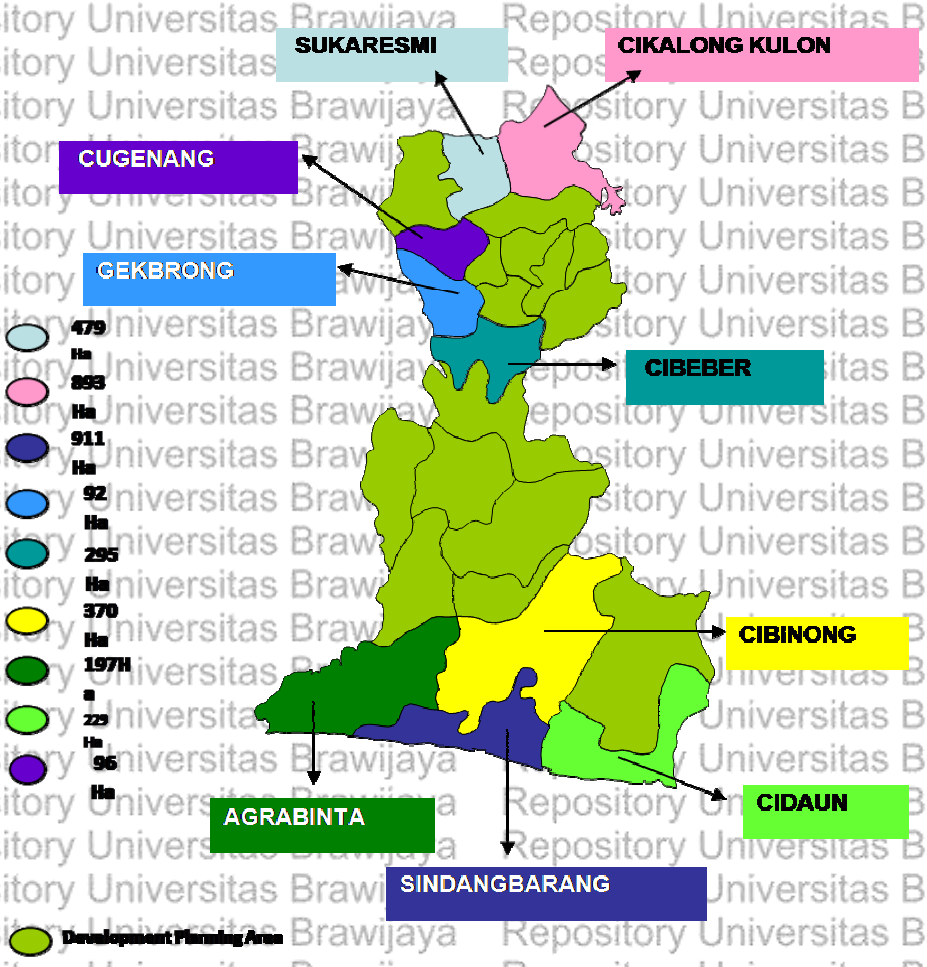

Figure 3. Banana production center in Cianjur District

3.2. Research Data Source

The data for this research have been compiled from the primary data collected on the basis of interviews conducted for 30 farmers (12 who adopted the SOP, and 18 who did not adopt the SOP) from Sarampad village, Cugenang sub-district, Cianjur. The following data were collected: the age of the household head, number of family members, landownership status, size of the banana farm, banana production volume, productivity, selling price of bananas, and income

from the banana sector. The other supporting data have been taken from the statistics data, government documents, mass media, and data based on observation.

3.3. Hypothesis

The hypotheses of the research are as follows: (1) the products' high selling price encourages the farmers to adopt the SOP; (2) the high yield encourages the farmers to adopt the SOP; and (3) the farmers owning large lands tend to adopt the SOP.

3.4. Analytical Model

The factors that influence the farmers' decision to adopt the SOP could be examined using ordinary least squares (OLS). OLS, first proposed by Carl Friedrich Gauss, is considered as a powerful and popular regression analytical method. In this study, the factors influencing the farmers' decision to adopt the SOP were estimated using the following model:

$$AP = \beta_0 + \beta_1 w + \beta_2 Pd + \beta_3 Pr + \beta_4 D + \varepsilon$$

AP = SOP application (1= SOP adopter; 0 = non-SOP adopter)

β_0 = intercept

β_1 = coefficient of Land size W = Land Size (m^2)

β_2 = coefficient of Productivity Pd = Productivity (kg/m^2)

β_3 = coefficient of Price Pr = Price (Rupiah)

β_4 = coefficient of Dummy D = Dummy (1 = distinguished market channel; 0 = common market channel)

ε = error term

AP (SOP application) is the dependent variable, and land size, productivity, price, and dummy are the independent variables. The regression model examines the influence of these variables in the adoption of SOP by testing the correlation between the dependent and independent variables. The dummy variable is used to adjust the price, because some samples in the sample population differ in value owing to the difference in market channels. The estimation model uses the R system.

CHAPTER IV
DISCUSSION

The descriptive statistics of the two groups are presented in the Table 4 below. The descriptive comparison of both the groups was conducted to determine how each variable influences the differences between both the groups.

Table 4. The average of Group 1 and Group 2.

	SOP group		Non-SOP group		
Variable	Average	STD	Average	STD	p-Value
Age (year old)	51.67	7.94	47.28	11.76	0.23249
Family member (people)	4.36	1.67	4.44	2.15	0.87489
Landownership status	0.92	0.29	0.72	0.46	0.16661
Wide area (m^2)	5,516.67	3,313.01	2,716.67	2,472.32	0.02174
Production (kg)	168.75	111.52	93.06	53.00	0.04534
Productivity (kg/m^2)	9.53	1.98	5.66	3.57	0.00074
Selling price (Rp)	1,358.33	178.16	1,108.33	285.04	0.00629
Income (Rp)	226,041.67	135,346.77	111,777.78	105,255.18	0.03644

The average age of the household heads in the SOP group is higher (51.67) than that of the non-SOP group (47.28), but the variety of the samples in the SOP group is lower (7.94) than that in the non-SOP group (11.94). The t-test results show that the difference between both the groups is not significant (0.23).

The average number of family members in the SOP group is lower (4.36) than that in the non-SOP group (4.44). The variety of samples in the SOP group is also limited (1.67) than that in the non-SOP group. This variable does not notably influence the farmers' decision, since the difference between both the groups is not significant (0.88).

The average landownership status in the SOP group is higher (0.92) than that in the non-SOP group (0.72). This indicates that the SOP group has more landowning farmers than the non-SOP group. The sample variation in the SOP group is lower (0.29) than that in the non-SOP group (0.46). The |p-value| is 0.16, which indicates that the difference between both groups is not significant.

The average land size of the SOP group is higher (5,516.67) than that of the non-SOP group (2,716.67). The sample variation in the SOP group (3,313.01) is also higher than that in the non-SOP group (2,472.32). The land size variable might influence the farmers' decision, since the difference between both the groups is significant (0.02).

The average production volume of the SOP group is higher (168.75) than that of the non-SOP group (93.06). Further, the sample variation in the SOP group is higher (111.52) than that in the non-SOP group. The production volume may influence the farmers' decision, since the difference between both the groups is significant (|p value| = 0.045).

The average productivity in the SOP group is higher (9.53) than that in the non-SOP group (5.66); and the sample variation in the SOP group is lower (1.98) than that in the non-SOP group. The difference between both the groups is significant (|p value| = 0.0007).

The average selling price in the SOP group is higher (1,358.33) than that in the non-SOP group (1,108.33). The sample variation in the SOP group is lower (178.16) than that in the non-SOP group (285.04), and the selling prices of each group also significantly differ (|p value| = 0.007).

The SOP group's average income from banana cultivation is higher (226,041.67) than that of the non- SOP group (111,777.78). The sample variation

in the SOP group is also higher (135,346.77) than that in the non-SOP group (105,255.18), and both groups show a significant difference (|p value = 0.036|).

The estimated OLS adoption function is presented in table 5, and the adjusted R-squared is 0.72.

Table 5. Estimation results for the factors determining the application SOP

	Coefficient	Std. Deviation	t-value
Intercept	(0.97469)	0.243281	(4.006)
Land size	0.00686	0.00198	3.457**
Productivity	0.07747	0.01780	4.350***
Price	0.05187	0.02785	1.862*
Dummy	-0.59564	0.18168	3.278**

Adj-R^2: 0.72
Significance code: (***) 1%; (**) 5%; (*) 10%

The estimation results from the regression model result show that all the three independent variables have a significant positive impact on SOP application. First, the selling price of the products influences the farmers' decision to adopt the SOP. A higher selling price indicates that the farmers have a stronger bargaining position in the market, because they already have their own marketing channel. These farmers are not dependent on the collecting traders of their villages who are the major buyers of farmers' products. The farmers usually sell their products directly to the private company as fruit distributors. To be accepted by the private company, the products must fulfill certain quality standard requirements; hence, the farmers realize the importance of technology application that will guarantee a high quality produce. Thus, they are enthusiastic

about applying SOP. In addition, they believe that the effort they invest in applying SOP will help them generate a different, higher income, because they can sell their products at a higher price than do the majority of banana farmers.

Another factor that could influence the farmers' decision to adopt the SOP is productivity. Here, productivity refers to crop yield per area. Farmers generating a higher productivity tend to adopt the SOP. The high crop yield might be a result of rainfall or other exogenous factors (Diskin, 1997), but for the plots in the same area, the difference in crop yield could be a result of different treatment of the plants. It is believed that the plants with a higher productivity might have received a more intensive treatment as compared to the plants with, low productivity. Hence, higher productivity is related to technology application. The farmers who already use better technology are aware of the important of technology. Therefore they are more likely to adopt new methods introduced to them.

Another factor that influences the farmers' decision is the size of their land. The farmers owning larger lands tend to adopt the SOP. It appears that the farmers holding large areas are more interested in technology application since they wish to maximize the potency of their land. A piece of large land may generate more income if it is well-cultivated; therefore, farmers tend to conduct intensive cultivation. Hence, they are more likely to adopt a new technology, because they are aware of the benefits of increasing their land's potency.

A higher selling price, higher productivity, and larger land size tend to contribute to the generation of a higher income for the farmer, because a larger land size could produce a good harvest and technology application could increase the production volume; hence, the products will sell at a higher price, thereby generating more income for the farmers. Such farmers are richer than

other farmers. Another reason that such farmers are more likely to adopt the SOP is that they have more capital to renew their land in order to adopt the SOP, unlike the majority of the farmers who face difficulties accessing the capital.

On the basis of the field observation, it is found that another factor that influences the farmers to adopt an SOP is their membership in a farmer group. The farmer group members tend to adopt the SOP, because they have good relations with the other farmers as well as access to the government fund for SOP adoption. Hence, the renewal of land as done by rich farmers is not the only condition for adopting an SOP; the smallholder farmers also stand chance to adopt the SOP as long as they are members of the farmer group.

Another advantage of being a farmer group member is that one could access production inputs through the group at a lower price than the market price. Moreover, they could sell their products to the farmer group, which is in partnership with the distribution company.

Field observation also showed that the application of the SOP helps the farmers generate a higher income compared to when they do not apply the SOP. This field observation has been conducted to overcome the limitations of this model, because some facts that could not surface during this research. The facts that were discovered during the field observation are complementary to the regression model as evidence in this research. In the future, the model should consider more data to be tested such that the model provides accurate evidence for the research location.

CHAPTER 5
CONCLUSION AND POLICY IMPLICATION

5.1. Conclusion

On the basis of the result of the application of the analytical model, we can say that the SOP has been successfully diffused to the richer farmers, since they have access to the market and are more interested in the technology application. These rich farmers also seem to have more capital to adopt SOP; hence it is easier to educate them, because the lack of capital discourages farmers from adopting SOP.

On the basis of the field observation, which is complementary to the analytical model, it is revealed that the SOP is better diffused through farmer groups. Farmer groups help farmers gain access to the government fund, so that they can generate additional capital to renew their land. Moreover, the farmer groups could help farmers access cheaper production inputs such as seeds and fertilizers, utilize the marketing channel of the farmer group, and develop good relations with other farmers and local extension workers. In this manner, the farmers who are member of a farmer group are more likely to adopt the SOP than those who are not associated with any farmer group. The field observation also revealed that farmers enjoy the benefits of adopting the SOP, because it helps them generate a higher income.

5.2. Policy Implication

Despite the positive impact of SOP application, some problems continue to exist in the diffusion of SOP. According to the result of the research, the SOP is well-accepted only by rich farmers. Therefore, it fails its purpose to empower the smallholder farmers, who are repressed and poor. In this case, the government should seek an ideal solution to encourage the poor farmers to adopt SOP.

To introduce the SOP to the majority of poor farmers, the government should educate the farmers about the basics, not just about the method of cultivation. The key problem in SOP adoption is the lack of capital, and this is why the rich farmers are more likely to adopt the SOP. Thus, considering the conditions required to adopt the SOP, the government should force the poor farmers to form farmer groups or join an existing one in order to access government funds. Through farmer groups, farmers can access not only government funds, but also micro credit.

It is noteworthy that sufficient finance for land renewal and not farmer's knowledge about cultivation method is the key requirement in adopting SOP. Therefore, the government should get involved in the activities of the production center and encourage the farmers to empower themselves through farmer groups. Moreover, the extension workers who are authorized by the government to educate the farmers in the field should also encourage farmers to form farmer groups.

The government has to further its effort by facilitating marketing channels, in order to guarantee a distinctive market for the farmers' products. Thus, the government can ensure that farmers fetch a higher selling price on bananas.

The higher selling price could attract the farmers to adopt SOP. Further, farmers who continue to feel reluctant to adopt SOP, will be interested in joining farmer groups because of the guarantee of a higher income.

References

BBC News. www.bbc.co.uk/news/world/. Rising Food Prices Increase Squeeze on Poor. May 32, 2011.

Berita Indonesia. www.beritaindonesia.co.id/. People Need Jobs not Pity. February 2, 2007.

Carletto, et al. 2007. Assets, Activities and Rural Poverty Alleviation: Evidence from a Multicountry Analysis. FAO.

Diskin, P. 1997. Agricultural Productivity Indicator Measurement Guide. USAID.

FAO. www.fao.org/hunger/. July 2010.

IFAD. 2007. IFAD Strategic Framework 2007 - 2010. IFAD

Islamy, M. I. 2004. Basic Principles of Public Policy. Bumi Aksara, Jakarta.

Janvry, A. D and Qaim, M. 2003. Genetically Modified Crops, Corporate Pricing Strategies, and Farmers' Adoption: The Case of Bt Cotton in Argentina. American Journal of Agricultural Economics.

Nurmanaf, A. R. and Supriyanto. 2006. Farmer Empowerment to Increase the Coconut Farmers' Income. Indonesia JurnalLitbangPertanian 25 (1): 33

Rodriguez, M. Yasunobu, M., and Yokoyama. T. Technology and Social Networks: Introducing Alternate Wetting and Drying (AWD) Technology in Deep Well Irrigation System, Tarlac, Philippines.

Rogers, D. 2003. Diffusion of Innovations. Free Press, New York.

Rusastra and Sudaryanto. 2006. Agricultural Strategic Policy in Production Improvement and Poverty Alleviation. Indonesia JurnalLitbangPertanian, 25(4): 116

Sen, A. 1999. Development as Freedom. Oxford University Press, New York.

Tempo. http://www.tempo.co.id/hg/nusa/jawamadura/2005/06/14/brk,20050614-62480,id.html. 22 Thousand Under Five Children in Cianjur are Malnourished June 14, 2005.

Willis, K. 2005. Theories and Practices of Development. Routledges, New York.

Appendices

appendix 1. The data source

Primary Data	Secondary Data
Age of the household head	Statistical Data
Family members	Government documents
Landownership status	Mass media
Land size of the banana farm	Field observation data
Banana production volume	
Banana selling price	
Income from the banana sector	