

**Ph.D. Thesis**

**Empirical Study on Innovation by a Mushroom Enterprise as  
New Agricultural Development Strategy in Indonesia**

**Graduate School of Bioresources  
Mie University**

**Rendi Febrianda**

**September 2018**

# **Empirical Study on Innovation by Mushroom Enterprise as a New Agricultural Development Strategy in Indonesia**

Rendi Febrianda, Ph.D. Thesis, Graduate School of Bioresources, Mie University, Japan.

## **Summary**

Indonesia holds plentiful bio-natural resources and after putting into industrial process, these resources likewise generate byproducts. Rather than wasted, some byproducts evidently could be utilized to be more valuable products. Mushroom farming applied the biotechnological science development by transforming the byproduct of timber industry into artificial cultivation medium. Furthermore, mushroom farming has become an attractive agricultural business especially in Indonesia due to its simplicity and flexibility. The awareness towards edible mushroom as a nutritious food that have healthy impact on human body helps to promote mushroom consumption and escalate its demand. Nevertheless, several evidences argued that the challenge in improving yield production of the farming appear to be the important issue. Market access and proper farming practice also arise as classical problems.

The general objective of this study follows up an idea of mutual development between the enterprise and its partners in improving the yield production of the farming to fulfill the demand. The objectives are divided into two main objectives. First, it aims to identify and to uncover the unique strategy and innovation of a mushroom enterprise for improving its business performance. Using technological (*innovation*) approach and qualitative method, it concluded that there are two types of strategies, one related to the technological part, and the other related to the organization part. The technological focuses on attracting market and enhancing the yield productivity. The organization part focuses on developing production capacity to fulfill the demand by making a contract agreement or a partnership. The partnership offers new occupation through a new simple farming without an apprehensive to market access and technical problems.

Within the partnership, the adopters/partners are indeed able to resolve their falter caused by such obstacles as market support and technical support. The partnership between an enterprise which has both technical capabilities and market access and the adopters from its local society can serve as an alternative new strategy for dealing with the obstacles. However, the question emerges concerning the effectiveness of partnerships on their implementation. Responses of the adopters are also needed for evaluating and reviewing the effectiveness of mushroom farming partnership to support the consideration of the partnership as a good

strategy. Therefore, the second objective of this study aims to review and learn the adoption of mushroom farming partnership for gaining more understanding about its strength and its weakness. It discusses the experience of an informal partnership case between a mushroom enterprise and the adopters using qualitative and non-parametric quantitative approach framed by Rogers's innovation decision process. The result shows that the partnership is truly recommended especially for rural society in certain conditions. The partnership is obviously successful serving a simple farming, however, several limitations of the partnership were found, and suggestions are optionally given for improvement.

This mushroom farming partnership is not flawless, however, it still delivers much benefit either for the enterprise or the adopters. This partnership could be implemented successfully especially to the novices as mushroom farming possesses such several superiorities as affordable capital, easy to practice, short harvesting time.

# Contents

	Page
<b>Summary</b>	i
<b>Contents</b>	iii
<b>Tables and Figures</b>	vi
<b>INTRODUCTION</b>	1
1. General Introduction	1
2. Indonesia Mushroom Farming Development Issue and The Obstacles	2
3. Oyster Mushroom Farming Innovation at A Glance	4
4. Problem Statements	5
5. Objectives of The Study	6
6. Significance of The Study	7
7. Limitation of The Study	7
8. Cianjur District of West Java Indonesia at Glance	7
9. Outline of The Enterprise	8
10. Analytical Approach	9
10.1 Innovation System	9
10.2 Innovation Adoption	10
11. Methodology	11

<b>CHAPTER I</b>	13
<b>STRATEGY AND INNOVATION OF MUSHROOM BUSINESS IN RURAL AREA INDONESIA: CASE STUDY OF A DEVELOPED MUSHROOM ENTERPRISE FROM CIANJUR DISTRICT, WEST JAVA, INDONESIA</b>	
1. Objective	13
2. Results and Discussion	13
2.1 Types of Innovation	13
2.1.1 Technological Innovation	13
2.1.2 Organizational Innovation (new organization)	13
2.2 ACC System of Innovation	14
2.2.1 Actors and Networks	15
2.2.2 Institutions	16
3. Conclusion	18
<b>CHAPTER II</b>	19
<b>LEARNING THE ADOPTION OF MUSHROOM FARMING PARTNERSHIP: A CASE STUDY OF FARMERS AND AN ENTERPRISE FROM CIANJUR DISTRICT, WEST JAVA, INDONESIA</b>	
1. Objective	19
2. Results and Discussions	19
2.1. Innovation-Decision Process	19
2.1.1. The Prior Conditions	19
2.1.2. The Knowledge Stage	23
2.1.3. The Persuasion Stage	24

2.1.4. The Decision Stage	25
2.1.5. The Implementation Stage	26
2.1.6. The Confirmation Stage	26
2.2. Inputs for Improvement of The Partnership and The Adopters	27
3. Conclusions	30
<b>CHAPTER III</b>	32
<b>GENERAL FINDINGS AND DISCUSSION</b>	
1. Three primary keys of mushroom farming characteristic	32
2. Public-Private Partnerships (International Experience)	32
3. The Model of Public-Private Partnerships (Indonesia Experience)	34
4. Mushroom Farming Partnership (The Experience of The Study)	36
5. Beneficial Aspects of The Mushroom Farming Partnership	37
<b>CHAPTER IV</b>	40
<b>GENERAL CONCLUSIONS AND RECOMMENDATIONS</b>	
1. General conclusions	40
2. Recommendations	41
<b>References</b>	43
<b>Supplementary data</b>	49
<b>Curriculum Vitae</b>	51
<b>Acknowledgements</b>	52

## TABLES AND FIGURES

Tables	Page
1 Data for total production and consumption of mushroom commodity in Indonesia	3
2 The mechanism of the mushroom farming partnership in sequential process	9
3 The benefits of a mushroom farming partnership	9
4 The classification of the adopters from early adopters to late majority	11
5 The scores of the group, education level, and sources of knowledge	21
6 Nonparametric correlation results	21
7 The attributes of the adopters	22
8 The differences of the trigger and the process toward the decision stage	26
9 The Benefits of general partnerships	34
10 Overview of AAC' mushroom farming partnership	36
11 The benefits, challenges and advantage of the mushroom farming partnership	37
12 Sample result of the business feasibility analysis	38
13 The income of the adopters	39
14 The given points for improvement of the partnership and the adopters	41

<b>Figures</b>		<b>Page</b>
1	The growth of the world mushroom production from 2000 to 2014	2
2	The trend of national production of mushroom & truffles commodity in Indonesia (1975-2014)	2
3	The oyster mushroom growing on a trunk/natural medium (a) and on an artificial medium/baglog (b)	4
4	Innovation phase by AAC	14
5	Innovation and business system of AAC	17
6	The background of the needs, problems and works, or practices	20
7	The socio characteristics of the adopters	21
8	The percentages of the adopters	22
9	The decision options for mushroom farming	30
10	Nucleus partnership pattern	35



## INTRODUCTION

### 1. General Introduction

Agriculture sector in Indonesia is one of primary sectors which is capable to empower a lot of manpower. In 2012, this sector employed 49 million people representing 41% of the total Indonesian manpower. In Indonesia, agriculture sector is not only holding a high contribution to gross domestic product/GDP but also becoming the driving force for other sectors (Ashari, 2009). This sector becomes invariably the main priority of Indonesian government's programs and strategies to alleviate poverty (Pasaribu, 2015). In this sector, there are 4 sub-sectors consisting of crops, horticulture, plantations, and livestock in which each sub-sector has various derivatives of commodities.

Nowadays, the action to transforming farm land into non-farm land has become a common phenomenon in Indonesia (Pasaribu, 2015). Working in agriculture is a tough work, sometimes the incomes are below the standard, therefore, the most difficult task for Indonesian government is that keeping farmers stay on farm. However independently, to increase the income, farmers may utilize their land for other types of agriculture. One of which is mushroom farming. Food and Agriculture Organization/FAO has been actively promoting mushroom farming for the rural development and the food security of developing countries (Marshall, 2009). Mushroom farming can become a propitious business and an attractive activity especially for the rural society as mushroom farming requires both access to unspecific land and slight capital needed (Barmon et al., 2012). Mushroom farming offers a great allure also as it does not depend on the external climatic conditions, possess short growing times and easy use of technology. Economically, it can reduce poverty and strengthen livelihoods through a quick yielding and a reliable source of income (Lelley, 1988; Marshall, 2009; Zhang et al., 2014).

Indonesia owns major advantages for mushroom farming as not only because of the plentiful manpower, but also Indonesia is the potential country that deliver abundant quantities of organic wastes from bioresources sectors. Since the cultivation of mushroom farming uses a technology made from organic waste as a growing medium of mushroom seeds, it becomes one of an effective recycling method that can perform an important role in managing and utilizing waste problem into valuable product (Beetz & Greer, 1999; Youri et al., 2004).

Indonesia has an estimated land area of  $\pm 187,751.9$  million hectares. The forested areas covered 95,271.9 million hectares (50.74%), and approximately 55% of these forested areas

were forests for production. Averagely there are 42,025 tonnes of sawdust are generated per year (KLHK, 2016). Sawdust used as the primary raw material for the growing medium technology, is a waste or a byproduct of timber industry from forestry sector. Rather than wasted, by utilizing this byproduct, mushroom farming has disclosed a new opportunity of agribusiness in Indonesia.

## 2. Indonesian Mushroom Farming Development Issue and The Obstacles

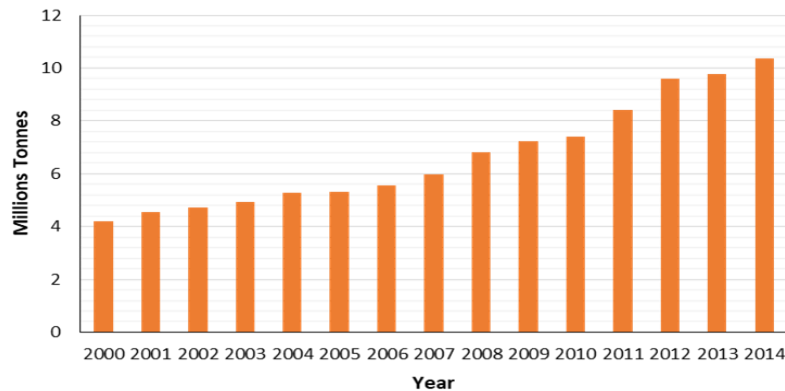


Figure 1. The growth of the world mushroom production from 2000 to 2014

Source: <http://www.fao.org/faostat/en/#data/QC>

As a part of the horticulture, edible mushroom commodity develops quite well especially the species of oyster mushroom. Referring to the statistical report of national horticulture production issued by the central government of Indonesia, in 2010, this commodity reached the highest number of production above 60,000 tonnes. In 2014, among the 25 vegetable commodities, it ranked 22<sup>nd</sup> by contributing 0.31% or approximately 37,410 tonnes (Dirjen Hortikultura Kementerian Pertanian, 2015).

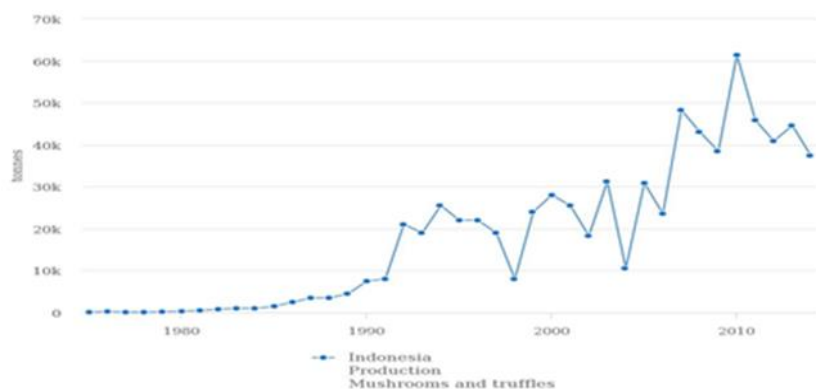


Figure 2. The trend of national production of mushroom & truffles commodity in Indonesia (1975-2014)

Source: <http://www.fao.org/faostat/en/#data/QC/visualize>

Despite the evidences have considered mushroom farming as an attractive agribusiness, its development seems stagnant and even in decline recently including in Indonesia (*see Table 1*). In 2014, the world mushroom production reached above 10 million tonnes that means Indonesia shared 0.85 % from that of production. China has dominated successfully the world production (*from Figure 1*) in each year. Japan, as a developed country, was successful on mushroom farming. However, because of high labor cost, it was difficult for Japan to compete with China. On the contrary, other countries such as Indonesia, India, and Vietnam have great potential for this farming (Zhang et al., 2014).

Table 1. Data for total production and consumption of mushroom commodity in Indonesia

Year	Production (000 Kg)	Consumptions (Kg/Capita/Year)
2010	61,000	-
2011	45,854	0.057
2012	40,886	0.057
2013	44,565	0.057
2014	37,410	0.087
<i>Average growth (%)</i>	<i>-10.64 %</i>	<i>17.54 %</i>

Source: The statistical report of Minister of Agriculture of Indonesia (Dirjen Hortikultura Kementerian Pertanian, 2015)

Few local studies have examined the business development of several mushroom small-medium enterprises (SMEs) in Indonesia. Those authors performed the SWOT analysis and concluded two major weaknesses. The first major weakness is that they have no sufficient capacity to meet the demand and have therefore to expand their production. The second is that the inadequacy of technological performance influencing yield productivity (Arminsyurita, 2014; Iriantintah, 2014; Nugroho, 2013). The findings were slightly prevalent by which the other authors have stated as well that mushroom business development, such as in Malaysia and Turkey, experience the similar weaknesses (Celik & Peker, 2009; Rosmiza et al., 2016). Eventually, these previous studies suggested to expand the scale and to enhance the technological aspect for gaining the quantity of the production.

Furthermore, practitioners in Indonesia such as mushroom farmers and the retailers also have claimed often that the local demand of Indonesian mushroom market have evolved much higher than the supply. They claim that not only higher productivity but also a higher quantity of mushroom farmers will be needed to comply with the demand. Indonesian society's

awareness of mushroom health benefits has resulted to the positive growth of the demand (Nugroho, 2013). The consumption data (*from Table 1*) may slightly support this claim and represent the growth of the local demand. However, attracting public interest to plunge into a new farming is not a simple thing. Having a new idea adopted, even it has obvious advantages, is often very difficult (Rogers, 2003). A previous study has identified specifically such aspects as the inadequate support for production and the deficient market support as the obstacles on the dissemination and adoption effort of mushroom farming (Pradhan & Nayak, 2014).

It can be concluded that the following statements are considered as the issue as well as the obstacle of this study.

- The demand evolves much higher than the supply. More quantity of mushroom farmers will be needed to fulfill the demand.
- The inadequate support for production and the deficient market support as the obstacles to the dissemination and adoption effort of mushroom farming.

### 3. Oyster Mushroom Farming Innovation at A Glance

In 1980, mushroom farming expanded by using an artificial medium instead of a natural medium which was primarily composed of sawdust. The new medium will be able to produce three to four times as many fresh yields of mushroom compared to the natural medium, in a shorter time. The cultivation also can be moved inside buildings, which permits manipulations of temperature, humidity, and light to improve yield. This grass-roots level of innovation has a particular role in the development of mushroom farming (Zhang et al., 2014).



(a)



(b)

Figure 3. The oyster mushroom growing on a trunk/natural medium (a) and on an artificial medium/baglog (b)

Source of image (a): <http://www.ediblewildfood.com/oyster-mushroom.aspx>

Edible mushrooms have been extensively consumed as nutritious foods which have a healthy impact on the human body (Cheung, 2010; Feeney, 2011). Edible mushrooms are valued for their high-quality protein, excellent unsaturated fatty acids, and high content of some vitamins. They are considered as low calorie foods, have anti-cancer properties, and are linked to the current concept of healthy diet (Kaldis & Kontogeorgakos, 2002; Marshall, 2009). These aspects help to promote mushroom consumption over the world thus raising the demand including in Indonesia.

Mushroom farmers used to have the capability of making the artificial medium or the baglog, then do the cultivation. Nowadays, the farming could be started directly and simply from the cultivation. Even without experience, people can join the farming through a partnership. Partnership is defined as collaborative arrangements among actors of society such as agricultural enterprise and farmers. It is used to address rural development challenges such as market access and technical support for small farmers (Kolk et al., 2008). Partnership for agribusiness can be defined likewise similarly to contract farming as a commercial relationship between an enterprise and a group of farmers, and considered to be a positive development of agricultural innovation in developing countries (FAO, 2013). The government of Indonesia has issued a regulation-number 44 in 1997 registering that partnership is a cooperation between small businesses with the principle of mutual need, mutual strengthening, and mutual benefit. Thereafter, various partnerships are adopted and implemented by various private sector especially between an enterprise and farmers. FAO noted that the initiatives of partnership are common, but the application in the agriculture sector is relatively new (FAO, 2016).

In Indonesia, these causes below support the development of oyster mushroom farming.

- The raw material for production is available throughout the year
- Natural conditions support for the growth of oyster mushroom
- Technology and cultivation are easy to be learned and put into practice
- The scale of business is flexible and can be adjusted with available capital
- Market demand continues to increase

#### **4. Problem Statements**

The issue needed to be addressed in this study emerged concerning about improving the production capacity by attempting dissemination and adoption effort of mushroom farming.

The initial hypothesis has explained that partnership (*cooperation between an enterprise and farmers*) can assist farmers in applying proper standards of production and in accessing the markets (Bitzer et al., 2013; Dentoni et al., 2016; Royer et al., 2017). This hypothesis is expected to be able to counter that of the obstacles. However, the effectiveness of partnerships depending on its implementation still need to be questioned (FAO, 2016). This study will provide the answers to the following research questions.

- a) whether the evident strategy to overcome the issue has been exist and implemented?
- b) The partnership has been considered as an alternative strategy to counter the obstacles towards the dissemination and adoption effort of mushroom farming. Nevertheless, in real application, how much effective the partnership in supporting the farmers?
- c) What recommendations that can be proposed to improve the application of the partnership?

## **5. Objectives of The Study**

West Java province is considered as the province of the mushroom production by a total production of 25,194,471 kg or about 67% of the national mushroom production in 2014 (Badan Pusat Statistik Kabupaten Cianjur, 2015). Cianjur as a well-known district of West Java province, is regarded as one of the central areas for mushroom farming in which 62.99% of the population are employed in the agriculture sector (BPS Kabupaten Cianjur, 2016).

In this district, there is a mushroom enterprise that turned out to has a unique strategy and has been dominating for 70% of the mushroom market in this district and even was able to achieve the performance award in 2009. This enterprise has implemented a partnership as well with its local society. This study is an empirical study learning from the experience of this enterprise and its partners/adopters on performing mushroom farming partnership. It will pursuit the following research statements:

- a) Identifying, from the enterprise's experience, the strategies or innovations which are successfully introduced to improve its business performance, and how to implement them.
- b) Reviewing the effectiveness of the partnership on supporting the development of mushroom farming.
- c) Framing the results into recommendations for the improvement of the partnership and the adopters' future development.

## 6. Significance of The Study

“While partnerships commonly are expected to contribute to the pursuit of sustainable agricultural development that is inclusive of smallholder farmers, several issues associated with the impact of partnership still need to be addressed to ensure the delivery of more effective partnerships” (FAO, 2016). This study provides the empirical information concerning the effectiveness of the partnership adoption on mushroom farming commodity and its impact towards the future development of the adopters.

## 7. Limitation of The Study

The limitation of the study consists of the following points.

- a) The scope is on an experience from one enterprise and its adopters/partners. Adopters and partners are taking the same meaning as the individuals who performs mushroom cultivation and incorporated with the enterprise.
- b) The case is an informal case in which the actors involved are the enterprise and the adopters only without other public partners support.
- c) This study focuses on the technology from the famous species of oyster mushroom (*Pleurotus ostreatus*) as one of the three major species in the world (Lahman & Rinker, 2002) and mostly dominates the mushroom markets in Indonesia.

## 8. Cianjur District of West Java Indonesia at Glance

Cianjur district consists of 32 sub-districts and 342 villages by 361,434.98 Ha of total areas. The areas are covered mostly by mountainous areas. Crops, horticulture, livestock, fisheries, plantations and forestry are the main sources of life for the society. The utilization of this district's areas include 83,034 Ha (23.71%) for productive and conservation forests, 58,101 Ha (16.59%) for wetland agriculture, 97,227 Ha (27.76%) for dryland agriculture, 57,735 Ha (16.49%) for plantation, 3,500 Ha (0.10%) in the form of grazing or yard, 1,239 Ha (0.035%) for ponds, 25,261 Ha (7.20%) for settlements and 22,483 Ha (6.42 %) for other uses.

The population in 2015 is estimated as many as 2,243,904 people live in the district consisting of 1,155,177 males and 1,088,727 females. Agriculture, forestry, hunting and fishery sectors comprise 35.97% of the occupation then followed by large trading, retail, restaurant, and hotel by 27.95%. Thus, the sector of agriculture still dominates the occupation of the society then trading sector. For mushroom commodity, in 2015, this district comprises

53,702 m<sup>2</sup> generating 816,804 kg of production (BPS Kabupaten Cianjur, 2016).

## 9. Outline of The Enterprise

Name of the owner	Triyono Untung Piryadi
Education	Gadjah Mada University - Plant disease study program (graduated in 1991)
Working experience	1. Research assistant at Gadjah Mada University, researching on straw and oyster mushroom science  2. Assistant supervisor, Farm manager at CV Inti Mekar Sejati (resigned in 1999)



This study names simply the enterprise as AAC enterprise. The owner of the enterprise has started to learn edible mushroom science since he took bachelor degree. After graduation, he used to work for big mushroom enterprise in Southeast Asia for 6 years until served as farm manager. In 1999, he decided to resign and tried to start his own agribusiness by hooking his co-worker.

AAC is the enterprise performing not only baglog manufacturing but also cultivation as well. While the other who performs the cultivation only is called the farmer. The farmer who incorporated with the enterprise within an agreement of the partnership is called partner or adopter. AAC established in 2003, is located at Salahuni village of Cugenang sub-district of Cianjur district. AAC has gained several achievements such as two study visits by Indonesia Minister of Agriculture in 2009 and 2010, the Food Security Award in 2009, invitations to speak at oyster mushrooms workshop in 2008 and oyster mushroom cultivation training in 2009, and to be a CEO and speaker at the Entrepreneurial E33 Force Development Forum in 2010. The appreciations come from government, agriculture magazines and academic institutions. Currently AAC hires 70 employees and cooperates with 30 contract partners/adopters as mushroom farmer. AAC owns 3 hectares of total land areas, produces 6 tons of fresh mushroom and 7000 baglogs per day. Its market covers from Cianjur, Jakarta, Bogor, Sukabumi to some areas in West Java Province. Overall the service of AAC consist of



mushroom cultivation equipment and supplies, mushroom seedling, mushroom baglogs, fresh and dried mushroom, and mushroom cultivation training.

AAC is known as one of the champions from Cianjur district implementing a partnership successfully with farmers. This Cugenang sub-district shares 73.5% of Cianjur district mushroom production (BPS Kabupaten Cianjur, 2016). In 2004, AAC dealt with its limitation to fulfill its demand from the local market of Cianjur district. In addition to comply with the demand, it offered a partnership so that at once to empower the local society of Cugenang sub-district. The mechanism of the partnership involves such points as those given in Table 2. According to AAC, a partnership of mushroom farming has several benefits which are divided into 2 types as shown in table 3.

Table 2. The mechanism of the mushroom farming partnership in sequential process

Enterprise (AAC)	Farmer
1) producing baglogs (artificial medium of mushroom) for farmers	1) baglogs prepaid in full
2) training of cultivation techniques	2) commitment to the training
3) providing technical services	3) providing space and capital for infrastructures
4) assisting cultivation control	4) performing the cultivation
5) providing market support	5) marketing fresh mushroom/yields to enterprise

Table 3. The benefits of a mushroom farming partnership

Benefits of Farming	Benefit of Partnership
1) Risks by nature are minimum	1) The role of the farmers is in performing simply process of cultivation. Any possibly technical issues and marketing aspects will be handled by the enterprise
2) It can be processed throughout the year	
3) The technology of the mushroom artificial medium is mature already, that is, the medium already contains the seeds and is admittedly able to produce fresh mushrooms with a rare rate of failure	
4) Mushroom farming need space for the cultivation house without a necessity of particular land like the usual agriculture	

## 10. Analytical Approach

### 10.1 Innovation System

An innovation is basically the introduction of something new like an idea, method, or so forth (Merriam-webster.com). Innovation implies the creation of new products or

qualitative improvement in existing products, the use of new industrial processes or creation of new market openings, or the development of new raw-material sources and other new inputs or forms of industrial organizations (Schumpeter, 1934). Schumpeter indicated that innovation is essential driver to seeking more profit.

Innovation itself has many kind of types, one of the dimension most commonly used to categorize innovations is radical or incremental dimension by Freeman and Perez. Radical innovation is an innovation that is very new (to the world, to industry, or to enterprises) and different from prior solutions, while incremental innovation is an innovation that makes minor changes or adjustment to existing practices. An incremental might has been previously known by the enterprise or industry (Schilling, 2012).

Mushroom farming is quite different from common farming as mushroom species has no chlorophyll, it does not need much sunlight and can be cultivated indoors using a growth medium culture on cylindrical plastic packs which is called by Indonesian people as baglog. The use of baglog technology is the key of the farming. The systems of innovation can be defined on several levels where this study adopts technological (*innovation*) systems approach. A technological system is defined as networks of actors interacting in a specific technology area to generate, diffuse and utilize technology (Carlsson & Stankiewicz, 1991). A technological system has a focus on a particular technology and its social networks. The boundaries and attention of technological system has been paid to the strategic actions of individual enterprise. The technological systems approach also pays attention to institutions, which can be actors's action and interaction including common habit, established practice, standards and so on. In short, it will be distinguished into two main elements, which make up technological system: actors and their competencies connected in networks, and institutions.

### *10.2 Innovation Adoption*

Rogers's theory of diffusion of innovation has been successfully used in many fields, especially in the cases of agricultural products, technology, and services. Rogers argued that any idea, practice, or object that is perceived as new by an individual or other unit of adoption could be considered an innovation available for study. Rogers described the innovation-decision process as "an information-seeking and information-processing activity, where an individual is motivated to reduce uncertainty about the advantages and disadvantages of an innovation". "An innovation may have been invented a long time ago, but if individuals perceive it as new, then it may still be an innovation for them". The

innovation-decision process covers five steps: (1) knowledge, (2) persuasion, (3) decision, (4) implementation, and (5) confirmation.

- 1) Knowledge—the individual is exposed to the existence of the innovation and gains some understanding of how it functions.
- 2) Persuasion—the individual will form a favorable or unfavorable attitude towards the innovation.
- 3) Decision—the individual chooses to adopt or reject the innovation.
- 4) Implementation—the individual puts an innovation into use.
- 5) Confirmation—the individual tries to verify the decision already made, or reverse this decision if exposed to conflicting messages about it.

Rogers also defined the adopter categories as the classifications of adopters in a social system on the basis of their innovativeness (*see Table 4*). Innovativeness is defined as “the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than other members of a system”. These categories are influenced by adopter characteristics such as the education level, the length of decision, wealth and so on.

Table 4. The classification of the adopters from early adopters to late majority

Groups		Requisites
Earlier Adopters	Early Adopters	<ul style="list-style-type: none"> <li>they also actively seek information about new ideas but are limited by the boundaries of the social system</li> <li>they hold leadership roles and serve as a role model for other members of a social system</li> </ul>
	Early Majority	<ul style="list-style-type: none"> <li>the same as early adopters but they seldom hold leadership or role model statuses</li> </ul>
Later Adopters	Late Majority	<ul style="list-style-type: none"> <li>economic necessity and peer pressure may lead them to the adoption of the innovation</li> </ul>

## 11. Methodology

This study used both qualitative and quantitative approach. As each part has a slightly different method, the methodology will be divided into two parts as explained as below.

- a) The first chapter used narrative style in which the data are obtained through

observations and in-depth interviews in 2015 with the owner and field manager as the key persons of the enterprise. The analysis is based on technological system framework. The secondary data comprised some reliable online and printed news as the enterprise has gained fame especially in Cianjur district. The plot of the first chapter could be divided into two parts: (1) identification of the type of innovation, and (2) analysis of how the innovations are built and implemented.

b) The data on the second chapter was collected by interview method in 2017. The interview guidelines were built upon the framework of the innovation decision process from Rogers's theory of Diffusion of Innovation (*see supplementary data*). The analysis of the second chapter was performed by using both qualitative and quantitative approach. The idea of the second chapter covered these 3 points:

- to operate a classification of adopters which refers to the requisites on Table 4. The adopter characteristics such as the education level, the source of knowledge, the length of decision, and the farming scale were examined and analyzed quantitatively by using nonparametric correlation technique to determine whether these variables relate with the classification of adopters.
- to understand the adopters experience during the five steps of the innovation-decision process. The data are presented and analyzed qualitatively using the framework.
- The notable points of the results will be discussed with the related reports, articles, and expert opinions for developing proper suggestions.

The targeted adopters were 30 partners (*mushroom farmers*) incorporated with the AAC enterprise. This enterprise is purposively chosen under the consideration that it is one of the best in Cianjur district both in productivity and partnership implementation.

## CHAPTER I

### STRATEGY AND INNOVATION OF MUSHROOM BUSINESS IN RURAL AREA INDONESIA: CASE STUDY OF A DEVELOPED MUSHROOM ENTERPRISE FROM CIANJUR DISTRICT, WEST JAVA, INDONESIA

#### 1. Objective

This chapter specifically aims to identify, from the AAC enterprise, its strategies and innovations which are successfully introduced to improve the business performance.

#### 2. Results and Discussion

##### *2.1 Types of Innovation*

##### 2.1.1 Technological Innovation

First, despite mushroom grow in a closed building, the problem of pest attack is remains, for example from insects. Thus, AAC developed a modified fragrance glue to produce a typical smell which attracts only insects and then captures them at once. By using this innovative method, the use of chemicals such as pesticides could be avoided for obtaining an organic mushroom product in drawing market attention.

The most important technological innovation of AAC is the incremental of efficient and mature processing of the baglog by optimizing the time and material composition of the baglog production. The process is efficient because it is faster than that of other enterprises, and it is mature because it overall has a failure rate of only about 2% by which each baglog has an average yield of 0.35 kg fresh mushroom. AAC claims that its baglogs own 99% yield capability of first grade fresh mushroom. AAC's baglog technology is also ready to produce in day of 30<sup>th</sup> until 35<sup>th</sup>, whereas the average time is 40 to 45 days. AAC even could sell baglog at price of 1500 IDR/item which nearly 500 IDR cheaper than common producers. When the standard baglog composition is occasionally modified to accelerate the capability of baglog, ACC uses simply the standard composition.

##### 2.1.2 Organizational Innovation

AAC has been established, owned, and managed by a former farm manager who used to work for a big shiitake mushroom enterprise. After resigning his job in 2003, he built his own enterprise. Then in 2004, AAC developed a cooperation with its local society in performing mushroom farming through a partnership. From 2004 to 2011, there are 30 adopters have joined with the partnership.

The partnership can be defined similarly to contract farming as an agreement between enterprise and farmers for the production and the supply of agricultural product under several agreement and predetermined prices. The agreement comprises input supply, technical advice and commitment of the partners/adopters to provide specific commodity in quantities and quality standard (Eaton & Shepherd, 2001). This AAC's organization aims to enhance the quantity of the mushroom production jointly by utilizing the local resource to become a mushroom farmer. The agreement and the mechanisms of the partnership are shown in Table 2. By this partnership, AAC can improve its productivity to 6 tonnes of the fresh mushroom product per day in which 51.4% of that product comes from AAC while the rest of 48.6% comes from the adopters/partners.

The mechanisms that have been made are not the same exactly as common contract farming as the adopters have no compulsion back to AAC in providing specific commodity, for example in this case is the fresh mushroom product. An additional benefit of this organization is that the social support brought in by the adopters. AAC can maintain harmony with its local society and neighbors as one of the security efforts.

## 2.2 ACC system of innovation

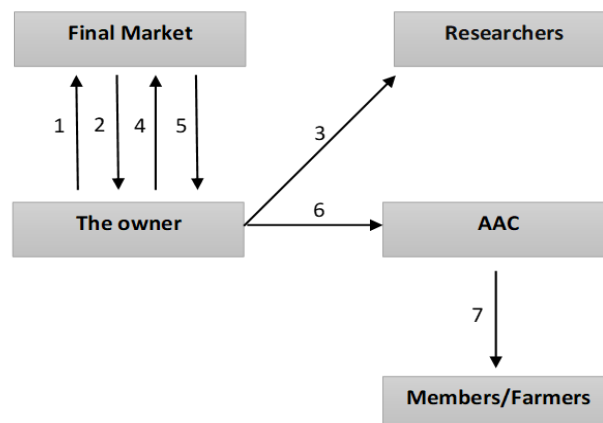


Figure 4. Innovation phase by AAC

Description:

1. Starting business and initial marketing in 2001, produced 5 kg mushroom/day, supported by one labor
2. There was much rejection from the market
3. Making a strategy for supplying a cheaper mushroom by performing the experiment
4. Entering market with the product from optimized baglog
5. Obtaining consumer and market preference

6. In 2003, the owner built the enterprise of AAC in lease land, and need more labors
7. In 2004, the demand was increasing highly, AAC established a partnership

### 2.2.1 Actors and Networks

This first section explains the role of the actors in innovation and their networking. These actors could be organizations or individuals. However, the enterprise is the main actor in technological system. Networking can be divided into two types, the non-market type (*related to the supply of knowledge and material supply*) and the market type (*related to the demand*). Actors in this system are divided into 5 actors consisting of AAC, researchers, farmers, suppliers, and final market.

AAC innovation system is started when it had difficulty to penetrate the existing market. Each retailer has their own producers plus distrust of newcomer especially from conservative/traditional market which is the market destination of AAC and the favorite place for Indonesian people to shopping vegetables. To overcome this challenge, the owner as the mastermind of AAC planned a strategy of supplying cheaper mushroom product that appeared better than that of other producers. Therefore, he needed to create more reliable baglog technology with superior yield performance.

From his working experience, he realized that there were many drawbacks with the baglog manufacturing process and they need to be addressed. Incremental innovations are very important for improving the efficiency of all factors of production (Geels, 2005). However, research evidences have indicated the skill constraints of small business and its impact on its ability to innovate (Freel, 1999). Dickson & Hadjimanolis (1998) stated that “*Since small enterprises typically lack some of the essential resources for innovation, such as specialist skills and research equipment, they have to acquire them from external sources, such as other enterprises, technical institutions, etc*”. The owner was aware with those condition and he maintained the assistance from public research institute. For almost 1.5 month, the owner conducted his small experiments. Inputs from the expert of research institute was claimed to be necessary to determine the boundary of the experiments. After all, he acquired the new knowledge and claimed that the experiment knowledge was in line with his presumption. He concluded a formula and stated that the excessive of time and some material composition on the baglog manufacturing process has no significant impact and instead consume much more of the cost and time. Thus, AAC was able to cut its production cost and to accelerate the manufacturing time for producing a better quality of the fresh mushroom product.

In the non-market type, the personal relationships between the owner and researchers from the public research institute are tied in exchanging knowledge and information. The relation is personal type between the owner and his old acquaintance. This type of personal relationship seems to be preferred as it was said easier and simpler than institutional relationship especially when they come from public institute. Failure of communication with research institutions due to complexities of access arising from bureaucratic and administrative processes become a very serious issue (Fontana et al., 2006). Moreover, the suppliers have a role in supplying raw material for baglog manufacturing, for example the sawdust as primary material. In subsequent time of supply, sawdust has become a distinctive business from timber industry. Sawdust business is the co-transition condition by which the transition of the main business has affected and issued another business.

In the market-type, high demand from the final market stimulates the organization innovation. After the experiment was success, AAC started over to market the fresh mushroom product to the retailers in traditional market even directly to consumers. The product gained consumer's preference then final market attention. The organic aspect of its product also become a supportive aspect in gaining preference. Gradually the demand is growing highly. In 2004, AAC met with its limited capacity to produce the baglog and to perform the cultivation at the same time. Therefore, the idea of the partnership emerged. Mushroom farming would give employment and business opportunities for youth and mid-age people in rural area especially in developing countries (Celik & Peker, 2009). Celik & Peker (2009) also represent the circumstance of mushroom business in which despite it seems to be professional work, mushroom business is managed by the people at low level education in rural area and they need short training on mushroom production. In its local situation, the challenge observed by AAC was that mushroom farming has no association/aggregation by which each farmer work independently on their business. AAC proposed the partnership under supervision benefits towards the cultivation equipment and supplies, the baglog, and mushroom cultivation training to achieving optimal production. This partnership is proposed then disseminated by the strategy of local champion in which one adopter was created as a role model to attract the others. In addition, feasibility study is provided by AAC to the candidates.

### 2.2.2 Institutions

Institutions consists of the customs, established practices, or standards influencing the actions of the actors. In the system, the owner of AAC acts as mastermind or primary agent of



the enterprise. The owner has flexibility without the complexities of hierarchy that giving AAC fast respond to changing. As the control functions are directly managed by the leader, new change for facing the challenge could be more easily to be reached (Nada et al., 2012). When the uncertainty of the strategy is high, organizations should interact more to gain new knowledge from the others (Tidd, Bessant, & Pavitt, 2005). The expert assistance from public research institute gave an important knowledge for the owner to enhance the baglog technology. The owner prefers to them of public institution for some considerations in which they are reachable in personal. Moreover, they carry out public service to society and business/industry making them overt and easier to be discovered than whom of private institution.

Most of the adopters are those who search for simple business and easy to perform. The attractiveness of mushroom farming lies on its simplicity of cultivation technique than that of other farming. For example, paddy farming is complex indeed but the markets are vast. Those who have never entered into mushroom farming generally have no access into mushroom market. Particularly when taking a new farming, farmers faced the risk of both market failure and production problems (Eaton & Shepherd, 2001). Whereas the motivation behind the decision of the farmers to engage in the partnership is, to obtain such advantages as market access and technical assistance (Guo et al., 2005; Masakure & Henson, 2005). The combination of mushroom farming and the partnership has become a proper strategy for dissemination. In addition to, AAC made an adjustment with the mechanism of the partnership to be more flexible which mean that AAC do not have a full control. AAC will provide the market access for the adopters who have no access and join with the partnership, contrariwise non-adopter can perform it by themselves.

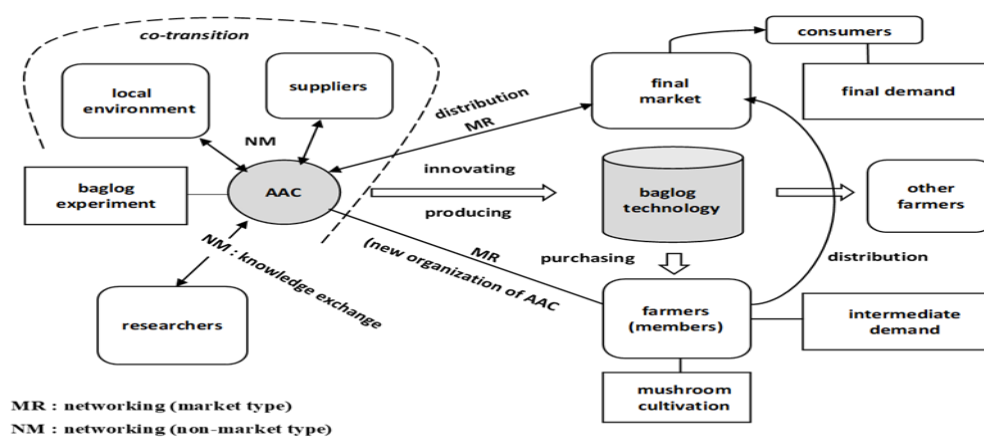


Figure 5. Innovation and business system of AAC

### 3. Conclusion

AAC reveals two types of strategies, one relating to the technological part, and the other relating to the organization part. The technological focuses on attracting the final market with cheaper and better quality of the fresh mushroom product. This aspect was achieved by the owner who indeed has had sufficient knowledge and experience. The organization part (*partnership*) focuses on developing capacity to fulfill the demand. The way of organization intends to increase the quantities of the fresh mushroom product jointly with its potential local rural society. The partnership could be a positive alternative way to intensify the business performance and to escalate the scale of production. AAC may overcome the land constraint, on the other side the adopters are secure from market and production failure.

The strategies of AAC were capable of being successful innovation by interacting and cooperating with external sources such as researchers from public research institute, the partners, suppliers, the market and surely consumer as the source of demand.

## **CHAPTER II**

### **LEARNING THE ADOPTION OF MUSHROOM FARMING PARTNERSHIP: A CASE STUDY OF FARMERS AND AN ENTERPRISE FROM CIANJUR DISTRICT, WEST JAVA, INDONESIA**

#### **1. Objective**

Some challenges may appear and the response from the adopters are also needed for reviewing the effectiveness of the partnership to support the consideration of the partnership as an alternative strategy. Learning the adoption of this partnership can offer more understanding to promoting it further. Adoption is a process from first hearing it until finally adopting it (Rogers, 2003). This study aims to review the experience on the adoption case of mushroom farming partnership into ongoing practice.

#### **2. Results and Discussions**

##### *2.1. Innovation-Decision Process*

##### *2.1.1. The Prior Conditions*

The earlier stage of the decision-making process of innovation is called the previous conditions before adoption. In this stage, there are previous practices, perceived needs and problems, and innovativeness. The implementation of the innovation ends at the point at which the new idea becomes a regular choice, often referred to as routinization (Rogers, 2003). Nowadays, mushroom enterprises implementing such mushroom farming partnership could be widely found, particularly in Cianjur district. Therefore, it is assumed that this partnership is starting to become a common case so that there will be several categories of adopters already.

As shown by Figure 6, majority of the adopters' previous practices were farmer consisting of paddy farmers and fish farmers. The needs and problems were varied. For example, employees reported the same point specifically that they were searching for other simple jobs that could possibly be done as a side job for obtaining additional income. Some farmers also reported the same need while the rest of these farmers were undergoing a different situation. They reported that they had no such needs until they noticed the benefit of this partnership from their fellows which became the reason for their adoption. All these farmers responded that before adoption, their problems were associated with the difficulty and failure risk of their farming. For small entrepreneurs and part-time jobs, they seemed to

make a similar decision from the beginning in seeking a business which did not require much capital. Despite departing from diverse problems, their needs were basically connected to an expectation of a simpler job that offered a more reliable source of income



Figure 6. The background of the needs, problems and works, or practices

This study does not predict the degree of their innovativeness as the number of the adopters are limited. After all, their socio characteristics illustrate that most of them were productive workers (*35 to 50-years-old*) with a low education level. Rogers stated that earlier

adopters had more years of education than later adopters did. Then a partial nonparametric correlation was created to see whether their education had a positive impact on their groups in this partnership.

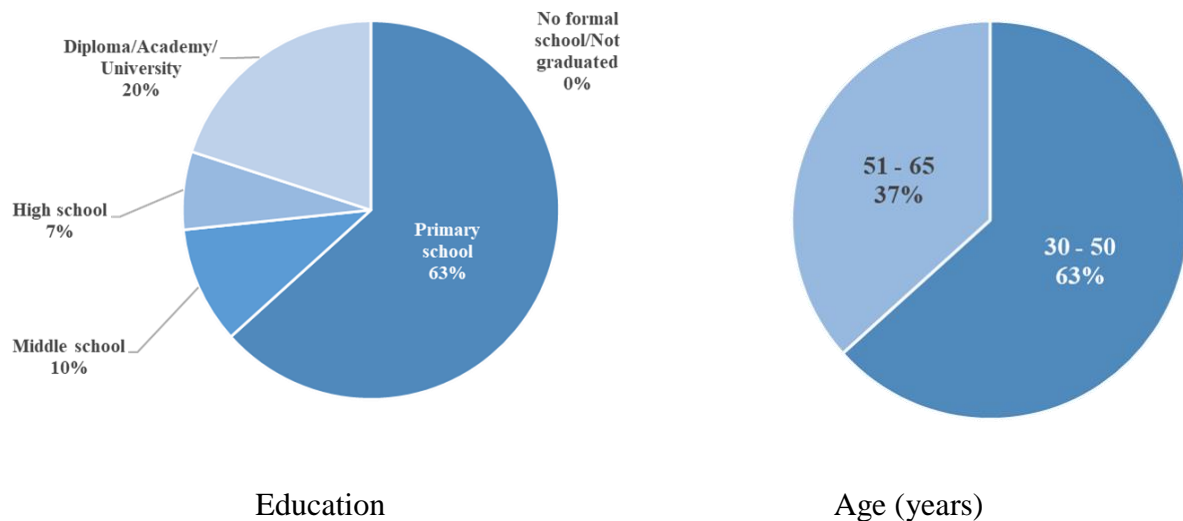


Figure 7. The socio characteristics of the adopters

Table 5. The scores of the group, education level, and sources of knowledge

Classification	Score	Education Level	Score	Knowledge Source	Score
Early adopters	3	Diploma/Academy /University	5	Enterprise	2
Early majority	2	High school	4	Associates	1
Late majority	1	Middle school	3		
		Primary school	2		
		No formal school / not graduated	1		

Table 6. Nonparametric correlation results

			Classification	Education	Knowledge Source	DecisionLength	StartingScale	MaximumScale
<b>Spearman's rho</b>	<b>Classification</b>	<b>Correlation Coefficient</b>	1.000	<b>.462*</b>	<b>.274</b>	<b>-.618**</b>	<b>.630**</b>	<b>.426*</b>
		<b>Sig.(2-tailed)</b>	.	.010	.143	.000	.000	.019
		<b>N</b>	30	30	30	30	30	30

\*. Correlation is significant at the 0.05 level (2-tailed).

\*\*. Correlation is significant at the 0.01 level (2-tailed).

Table 7. The attributes of the adopters

Respondents number	Education score	Knowledge Source score	Knowledge Exposed year	Decision year	Starting Scale (baglogs)	Maximum Scale (baglogs)	Classification score
1	2	1	2005	2007	2500	30000	1
2	5	2	2004	2004	5000	100000	3
3	2	1	2007	2009	3000	40000	1
4	2	1	2006	2009	3500	33500	1
5	4	2	2004	2005	3000	35000	2
6	5	1	2005	2006	4000	50000	2
7	2	1	2006	2007	5000	45000	2
8	2	2	2004	2008	2000	32000	1
9	4	1	2005	2005	2500	38000	2
10	3	2	2004	2006	4000	60000	2
11	3	1	2006	2006	3500	40000	2
12	5	2	2004	2005	4200	50000	2
13	2	1	2006	2007	3000	33000	2
14	2	1	2009	2011	2500	32500	1
15	2	1	2009	2011	3300	53300	1
16	5	2	2004	2006	4500	64500	2
17	2	1	2009	2010	2500	30000	1
18	2	1	2009	2010	2000	42000	1
19	5	2	2004	2007	2000	32000	1
20	2	1	2008	2009	4500	55000	1
21	2	2	2004	2007	2300	32300	1
22	2	1	2007	2008	3000	33000	2
23	2	1	2007	2009	2800	33000	1
24	2	1	2006	2007	4500	44500	2
25	5	1	2007	2008	2500	35000	1
26	2	1	2006	2007	4500	44500	2
27	4	1	2005	2006	3000	33000	2
28	5	2	2004	2005	6000	36000	2
29	2	1	2008	2009	2300	35000	1
30	2	2	2004	2005	2500	30000	2

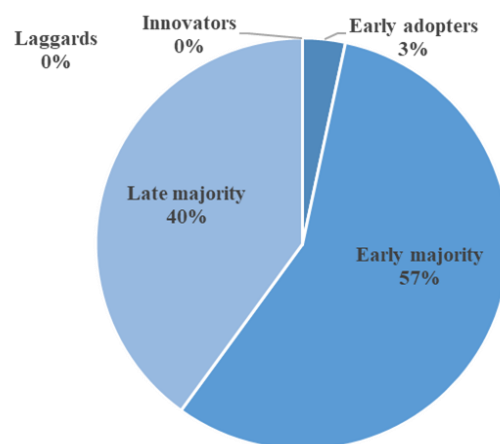


Figure 8. The percentages of the adopters

The stipulation of the adopters is classified qualitatively based on the requisites from table 4 then the score is given. The keys of the stipulation are the triggers and the length of decision. These are explained further on the decision stage. Generally, there are two main groups of them: earlier adopters (*such as early adopters and early majority*) and later adopters (*such as late majority*). Later adopters are the people adopting due to economic necessity or peer pressure.

Majority of the adopters who come into the partnership with AAC enterprise are earlier adopters. This occurred presumably due to this enterprise was being included as a pioneer in executing a partnership. The result of the correlation indicates that education has a positive relation to their groups (*see Table 6*). This result is in line with the previous results (Mahajan, 1990; Rogers, 2003) however there are low educated people who also quickly adopted into this partnership.

### 2.1.2 The Knowledge Stage

This stage aims to describe how the knowledge about the existence of the partnership occurred. “The knowledge stage occurs when the individual is exposed to the existence of the innovation and gains some understanding of how it works” (Rogers, 2003). The information of the mushroom farming partnership was disseminated in two ways: direct dissemination through a gathering event conducted by AAC and interpersonal communication of the society. This information was initially disseminated in early 2004 and only 10 of the adopters claimed obtaining the information directly from the enterprise. The rest of them reported that they obtained the information from their associates or through peer networks. Once an agricultural innovation reaches an individual farmer, horizontal transfer of the new idea passes through the peer networks among their relatives and fellow villagers so that this channel of social networks is also considered as playing a role at the early stage of dissemination (Rogers, 2003; Zhang et al., 2014). The correlation performed to find whether their source of knowledge was related to their groups shows a weak relation (*see Table 6*).

The enterprise was reportedly offering the type of farming that was easy for everyone, that was low risk, and quite profitable. It marketed a more reliable baglog technology for mushroom cultivation and it also offered a partnership that will grant assistance to the aspects of production and marketing. The partnership was intended for those who had no experience of mushroom farming. In short, the partnership pursues the novices. None of the adopters had the knowledge and experience about the function of the partnership. In case of complex

systems that require even greater knowledge, a greater tendency for rejection or discontinuation may occur (Rogers, 2003). However, all of them found no trouble in comprehending such a simple offer during the explanation as no specific skill or knowledge was needed. On the contrary, the function of the partnership is believed to be useful to reduce the skepticism and at the same time to attract the interest. In this stage, the following reasons were found as good reasons for the adopters to continue to the next stage:

- Mushroom farming is simple and low risk. The partnership can reduce the skepticism from new users about the probability of production failure and market confusion.
- Some respondents revealed that the profit was reported also in this stage for about 20%–22% per baglog, while some of them gained this knowledge in the persuasion stage.

### 2.1.3 The Persuasion Stage

In the persuasion stage, the adopters deepen their knowledge by seeking information about the advantages or disadvantages and form a favorable or unfavorable attitude towards the mushroom farming partnership. The main source of this stage is the enterprise and it was reportedly available for all candidates or even anyone who needs to make a meeting or discussion regarding the partnership. In this stage, there are also auxiliary sources which were the earlier adopters. These sources helped in providing detailed information about the partnership to their associates, especially to the later adopters.

In the persuasion stage, Rogers designates an attribute which is called the relative advantage of the new idea. This is the characteristic to which an innovation is perceived better than the idea it replaces. The idea that it replaces is that mushroom farming in which case a farmer must have both the ability to make an artificial medium technology/baglog before doing the cultivation. Unfortunately for novices, this common idea takes a long time as it requires specific skills, effort, practice, and experience. All adopters reported the same favorable points that the partnership is perceived as quite helpful without thinking about skill and experience. Briefly, the enterprise made the farming sound simple. The unfavorable point of this partnership is lack of funding support. Either the enterprise or the financial organizations were not found supporting their financial aspect. This meant that the candidates must have had to have enough financial capacity. Their understanding in this stage included the points below:

- The mechanism of the mushroom farming partnership.



- The enterprise provided requested feasibility study for the partnership to indicate the prediction of capital, cost, and profit.
- There was no funding support. For the partnership, farmers are needed to have their own capital and space for farming. Fortunately, mushroom farming is flexible. It can use any available spaces, or, in other words, it does not require ground or a specific farmland. The farming layout can also be done vertically using shelves, resulting in excellent space efficiency.

#### 2.1.4 The Decision Stage

In the decision stage, the adopters choose to adopt or to reject. In this study, there are no rejections as it is designed for the adopters and there is no discontinuance as all adopters are still active farmers.

In this stage, the adopters finally commit to the enterprise to get into the partnership. They reported that once they decided to join, they agreed to prepare space for farming and cash for each component of the baglogs, tools, and construction of the cultivation house. Some of them could erase the cost of the house by using their own resources. Since no supporting funding or credit provided, majority of the adopters claimed that they started with deposit money, while the rest obtained loans from their relatives. The main point as the background of their decision, both the earlier adopters and the later adopters claimed the same points: the easiness and low risk of performing the business. However, the triggers were different and divided into 4 categories (*see Table 8*). The earlier adopters decided to adopt due to their own confidence attaining directly from the enterprise. While for the later adopters, the role of their peers who seemed successful influenced their decision and became the main trigger. In this case, there is one adopter who served frequently as a role model.

The stipulation of the adopters is also influenced by the length of their decision in which earlier adopters had shorter innovation-decision periods (Rogers, 2003). The shortcoming is, the length of their decision is not detailed (*months and days*), as most of the adopters are not able to remember the details. Nonetheless, the result shows that the length of their decision relates to their groups negatively (*see Table 6*). This means that the lower the score (*for example later adopters*) the longer the length of their decision.

Table 8. The differences of the trigger and the process toward the decision stage

Category	Trigger and Process	Classifications
1	Knowledge from enterprise—continue to persuasion stage— trigger from enterprise—decision stage	Earlier adopters
2	Knowledge from peers—continue to persuasion stage— trigger from enterprise—decision stage	Earlier adopters
3	Knowledge from enterprise—restraining for some time— trigger from previous adopters—continue to persuasion stage—decision stage	Later adopters
4	Knowledge from peers—trigger from previous adopters— continue to persuasion stage—decision stage	Later adopters

### 2.1.5 The Implementation Stage

This is the stage in which the adopters put the partnership into use. For the first time, this stage includes 4 steps: (1) construction of the cultivation house, (2) baglogs purchasing and distribution, (3) cultivation activity, and (4) marketing. Each baglog produces for one cycle (*approximately 4 to 5 months*) and the marketing will be picked up by the enterprise. Afterward, once the first cycle is finished, the stage will start again from the second step and so on.

The average starting scale of the adopters was 3330 baglogs/adopter and the average maximum scale is 41,736 baglogs/adopter. The problem which was found at this stage was also related to the lack of access to funding support. The adopters were supposed to be smart enough to set aside the returns for scale improvement. Earlier adopters were usually wealthier and had larger-sized units for farming (Mahajan, 1990; Rogers, 2003). The result of the correlation also supports the same argument in which the earlier adopters of this partnership tended to have bigger scale of the farming than later groups either at the starting scale or the maximum scale (*see Table 6*).

### 2.1.6 The Confirmation Stage

The confirmation step is taken as an evaluation of the positive and negative aspects of the adoption whether decide to continue or discontinue it. The claims reveal that the continuation of the partnership still serves a positive outcome, although there is a hidden issue.

Based on the mechanism of the partnership, the yields of the fresh mushroom product from the adopters will be assigned to the enterprise based on the agreed selling price. The selling prices of the yields are reportedly monotonous as the enterprise concentrates only on conservative markets. The partnership does not ban them from quitting, yet the farmers who possess a diverse market for obtaining a higher selling price must leave the status quo of the partnership. After all, this system was aimed principally for novices. The selling price of other mushroom farmers who are not incorporated with a partnership and pursue demands from supermarkets and central markets have the selling price twice to three times higher than the partnership farmers. AAC enterprise picks conservative markets because the payment is direct so that the cash flow becomes faster. For example, in supermarkets the payment will be given usually after three to four weeks from all receipts. This is a reasonable reason as the scale of its production is large already, however, the demands from different markets are also a profitable option. In this case, loss of after-sales services such as technical services which may be still needed and the reluctance to perform self-market distribution are the reason for ceasing the partnership.

## *2.2 Inputs for Improvement of the Partnership and The Adopters*

The adoption of agricultural innovations in developing countries generally deals with several constraints such as the lack of credit, limited access to information, reluctance to risk, inadequate incentives associated with human capability, and so on (Feder et al, 1985). In this partnership, three notable lessons are identified:

- In the knowledge stage, the information is diffused once and then continued by the interpersonal communication of society. Not the whole of the local society (*for example in Cugenang sub-district*) cognizes the information about mushroom farming partnership. The information is estimated also to diffuse slowly and finds it difficult to reach outside.
- In the persuasion stage, a lack of access to funding support was found.
- In the confirmation stage, the selling price of the yields from the enterprise is monotonous. Some respondents claimed that they found other markets with higher selling prices, but they were still sluggish to release the partnership.

The findings support previous notes indicating that general partnerships of agribusiness on fresh vegetables commodities have several constraints (Purnaningsih, 2006) such as (1) the information of the partnerships is not widespread and spread for only certain

groups, (2) not all farmers have access to capital and they are reluctant to engage with bank credit, and (3) the price is determined by the partner enterprise. Therefore, suggestions are given both for further use of the partnership and for improvement of the adopters as described below:

- Mass media channels enable information to reach many audiences rapidly, create knowledge and spread information (Rogers, 2003). As enterprises have limited resources, cooperation with government or other private organizations' resources is a decent option to support the earlier stages through all possible channels such as mass media like television, radio, magazines, or agricultural extension service. The evidence in disparate area of Indonesia shows that the trend of mushroom farming is gradually increasing after it was pushed weekly by collaborated parties through an agricultural clinic program with the local television (Febrianda & Laili, 2016). Nowadays, internet could be also an effective media for spreading information like a post on social media. In promotion, we should explore the use of alternative media such as the internet to get a wider audience (Duffy, 2000). Mushroom farming is convenient for both urban and rural areas, nevertheless, when dissemination is taking in rural areas, not all rural society have access to mass media or internet especially in developing countries. Personal communications like extension services are still needed, at least when persuading or convincing and dealing with resistance (Altalb et al., 2015; Rogers, 2003). The extension service itself can deliver a knowledge about the information of the products or services (Anderson & Feder, 2004).
- Rogers indicates that most change agents hope to speed up the process of the innovation-decision by communicating the information of new ideas more rapidly so that the knowledge is created at an earlier date which shortens the amount of time required for the innovation-decision (Rogers, 2003). Conversely, the people who most need the benefits of a new idea (such as the less educated people or poor people) are generally the last to adopt. The result of the correlation shows that only the education level and the scale of farming has a positive relation to their classification. The focus of the early dissemination effort may be placed on the higher educated and wealthier people while engaging these people as role models to obtain the interest of other people.
- The farmers who are usually included in a partnership or contract farming are rarely poor farmer (Ton et al., 2018). Government can specifically facilitate the development

of partnership through direct incentives, for example, public funding conditional on private co-financing (OECD, 2014). By incorporating financial institutions into the partnership agreement and providing farmers with several incentives such as government guarantees, subsidized credit, and access to finance for small farmers, they will be able to afford the requirements of the investments in order to participate in the partnership (FAO, 2016). Incentives likewise have been paid in order to speed up the diffusion of innovations in a variety of fields (Rogers, 2003). In this mushroom farming partnership, most of the adopters were those who had adequate capital while the rest were people who had to obtain loans from their relatives. Meanwhile, rural society mostly fears to engage with banking credit because of the complicated terms on credit proposal and their poor management. The allocation of the credit from the bank is low as well due to the viewpoint of agricultural business as a risky business (Ashari, 2009). Within the partnership, the adopters will obtain management and production support that will minimize the possible risk, therefore, incentives or subsidized credit access may be needed so that the partnership can be used to empower underprivileged people but have good potency and interest.

- Transparency of the yields selling price from the enterprise to the adopters has been maintained to protect the satisfaction of the adopters. However, formal regulation which governs the selling price of mushroom commodity is still not formed. Therefore, the selling price will refer to the market destination (*conservative markets/supermarkets/central markets*). In such formal partnership as in palm oil plantations of Indonesia, the selling price must follow the regularity from government. In this study, the selling price of the yields is set by the enterprise following the price from conservative market. The adopters who intend to pursue more profitable markets may leave the partnership and prepare for self-market distribution. Either intermediate farmers or producers are the good progress for the adopters of the partnership toward their future development (*see Figure 9*). Farmers can allocate mushroom farming as a side business as it is efficient in terms of time, land or space, and capital. However, if they wish for the maximum result, they should focus by increasing the scale of the farming or develop the capacity by changing from a farmer who only cultivate to become a producer who can produce the baglog as well (Wayan et al., 2015). Basically, mushroom farming is simple and less risky. The main key to this farming is the reliability of an artificial medium (*baglog*) in producing

high-quality yields. By purchasing baglog from credible producers, mushroom farmers may focus on marketing their yields. However, for the novices, the partnership is the safest option.

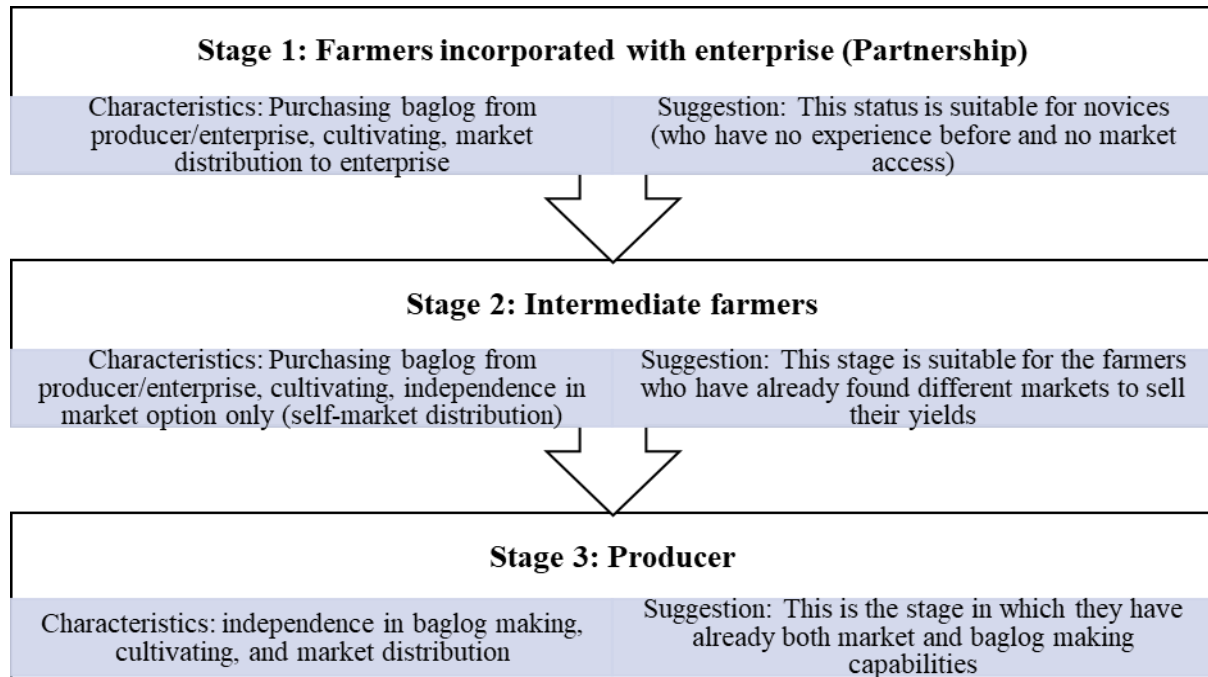


Figure 9. The decision options for mushroom farming

### 3. Conclusions

63% of AAC adopters are low educated people. Meanwhile, 57% of the adopters are in the early majority group. Partial correlation results show that the education level, length of the decision, and the scale of farming have positive relations to the adopters' classification except for the source of knowledge. The earlier adopters who have adopted this partnership more quickly tend to have higher education levels, shorter lengths of the decision, and bigger scale of farming.

The result of the innovation-decision process shows that most of the adopters' problem was associated with their heavy work so that they expected for simpler work. Mushroom farming is simple and less risky, and the partnership can counter the failure probability in production and market confusion for novices. This is the reason why this partnership could also be afforded and adopted by few low educated people. The simplicity on performing the farming become the reason why this partnership could also be afforded and adopted quickly by few low educated people.

This partnership is truly recommended in three conditions. First, at least have

sufficient capital for the farming. Second, they must be novices who have no experience before and no market access. The third is that there must be no objection to the set price of the yields. Unlike formal partnerships, this informal partnership possesses several limitations.

AAC and its partners/adopters operate this partnership without public partners (*government/bank*) support though. However, these optional notes are built as improvement to the use of similar partnership and the future development of the adopters such as:

- 1) Enterprise may cooperate with other parties on dissemination through extension programs, mass media or internet to reach a wider society
- 2) The focus of the early dissemination effort may be focused on higher educated and wealthier people while engaging these people as role models to obtain the interest of others
- 3) Government and banking services could also cooperate in facilitating incentives and subsidized farm credit access to the partnership
- 4) Previous models still show the best system for achieving maximum business development. After some period of implementation, the adopters may be encouraged to improve their capability not only as a cultivator but also as a producer because the baglog (*artificial medium technology*) is the main key of the business development. To get a more profit, the adopters may exit the partnership as an intermediate farmer and move to other profitable markets. However, as a producer, they can be independence both in production and in the market.

## CHAPTER III

### GENERAL FINDINGS AND DISCUSSION

#### 1. Three primary keys of mushroom farming characteristic

This study concluded that mushroom farming delivers three characteristics making the collaboration (*mushroom farming + an informal model of the partnership*) is being possible to be implemented successfully even without other public partners supports. The characteristics are consisting of:

##### 1. Affordable investment and production cost.

There is no fund support and incentives from public partner within this model. The adopters use their own budget to join. The type of this partnership requires affordable investment and cost that is still accessible. In this case, mushroom farming does not require a particular land which means that they can utilize any owned available space. This aspect will eliminate one major part of the investment allocated for land requirement.

##### 2. Easy to practice.

An implementation that easy to be performed. The adopters spent less time for trainings and practices.

##### 3. Short harvest time.

Several partnerships reported slower than expected payback periods, lower than expected returns on investment as well (FAO, 2016). When they spend their own budget, a rapid revenue aspect may become naturally the expectation. One of the most attractiveness of this farming is its short harvesting time. The baglog can produce in a short time (*averagely, 6 times harvesting for 4-5 months*).

#### 2. Public-Private Partnerships (International Experience)

Public Private Partnership (*PPP*) is a mechanism of cooperation undertaken by government with private sector in a way of sharing resources, knowledge, and risks to improve production the efficiency and distribution of products and services (Hartwich et al., 2008). FAO has study through the 15 countries reports and 70 individuals agribusiness partnership case studies with details provided on the design, management, and performance (FAO, 2016). Agribusiness partnerships have the potential to deliver on some of the promised benefits. For smallholder farmers, many of the partnerships showed evidence of positive impacts on net income through improved market access, increased productivity, improved



product quality, and reduced costs. For the government, in addition to achieving socio-economic targets associated with the partnership projects, general benefits included the strengthening of public-sector institutions and skills in project design and management. At the enterprise level, benefits were reported in terms of increased sales or productions and market shares and/or greater availability of raw material supplies.

For the purpose of their study, a partnership for agribusiness development is defined as:

*“a formalized partnership between public institutions and private partners designed to address sustainable agricultural development objectives, where the public benefits anticipated from the partnership are clearly defined, investment contributions and risks are shared, and active roles exist for all partners at various stages throughout the PPP project life cycle”*

The annotation for the definition:

- Public partners include national and decentralized government agencies, publically funded research and education institutions, State banks and State-owned enterprises (SOEs). International donors are also considered to be public partners.
- Private partners include agribusinesses, farmer associations, individual farmers and non-governmental organizations (NGOs).
- Public benefits are the expected (positive) outcomes from public-sector support to the partnership as defined by the goals and objectives outlined under national agricultural policy and strategy documents. Examples of public benefits include rural employment and income generation; food safety and food security; and environmental protection.
- Agribusiness enterprises are any firms or business entities that produce or provide inputs, produce raw materials and fresh products, process or manufacture food or other agricultural products, transport, store or trade agricultural production, or retail such products.
- Formal agreement is agreement for which consent alone is not enough, i.e. the agreement has to be embodied in a written document. Such agreement can range from project-level documents such as a memorandum of understanding (MOU), to formal contracts, equity arrangements and the establishment of new companies specifically for the purpose of the partnership.

Source: (FAO, 2016)

The formulated benefits of public private partnership are framed by FAO as mentioned below on Table 9.

Table 9. The benefits of general partnerships

Indicators	Benefits
Efficiency	<ul style="list-style-type: none"> <li>• Increased productivity of farmers and small-medium agri-enterprises (SMAEs)</li> <li>• Improved access to finance</li> <li>• Improved competitiveness</li> <li>• Increased exports/domestic sales</li> <li>• Private-sector investment stimulated</li> <li>• Increased management skills of enterprises</li> <li>• Improved technical skills of farmers</li> <li>• Improved technical and managerial skills of farmers</li> </ul>
Sustainability	<ul style="list-style-type: none"> <li>• New jobs created</li> <li>• Increased income for farmers and SMAEs</li> <li>• Environmental benefits</li> <li>• Improved food security</li> <li>• Reduced social instability and criminality</li> </ul>

Source: (FAO, 2016)

### 3. The Model of Public-Private Partnerships (Indonesia Experience)

Agribusiness partnership program in Indonesia has grown since 1970 and the principle of the partnership had been applied first for the development of smallholder farmers of sugarcane plantations in East Java. The partnership program subsequently has expanded to all commodities of agricultural sector in Indonesia (Zakaria, 2015).

The most famous public-private partnership in Indonesia is the nucleus partnership by palm plantations. This is the partnership among public partners (*state-owned bank, local government, and central government*) and private partners (*palm oil plantations, and village unit cooperatives*) contributing to the empowerment of village unit cooperatives to increase the income of farmers. For example, in this nucleus partnership, a state-owned bank of PT Bank Rakyat Indonesia TBK provided a subsidized loan to the farmers (*at 16 % interest per annum which is 9 % points lower than the commercial rate of 25 %*) through village cooperatives, guaranteed by the nucleus enterprise/private plantation enterprise of PT Sampoerna Agro TBK (FAO, 2016).

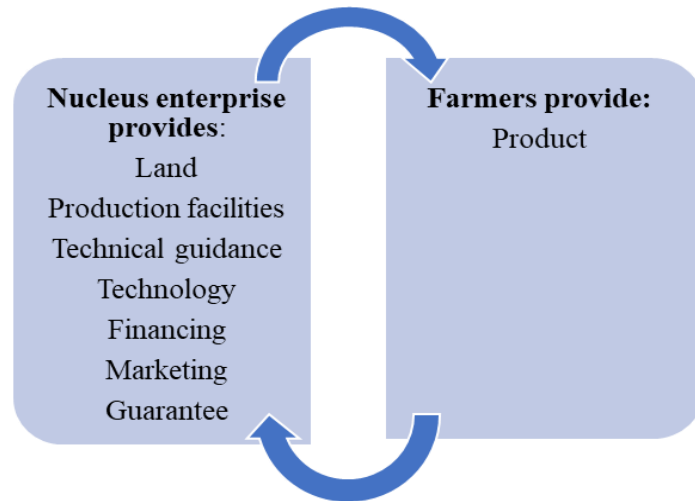


Figure 10. Nucleus partnership pattern

Source: (Pasaribu, 2015)

As the nucleus partnership is a formal partnership, the mechanism is much more complex as described as below:

The mechanism of the nucleus partnership:

- The bank assesses business feasibility and eligibility.
- Creating memorandum of understanding (MoU) which binds the rights and obligations of each party (public partners and private partners).
- The grants are transferred to the nucleus account, then further disbursed to the farmers in the form of infrastructures and production or cultivation facilities.
- The farmers perform the production or cultivation.
- The yield of the production will be sold to the nucleus enterprise at a price agreed upon on the MoU. The price refers to the government' provision.
- The nucleus enterprise will deduct some portion of the selling price of the production to be handed over to the bank as loan installment and the rest is returned to the farmers as their net income.

Corporate Social Responsibility (CSR) programs from large enterprise (*private or state-owned enterprise*) are also widely distributed through partnership schemes. CSR funds are given in the form of low interest credit to farmers. For example, the empirical evidence of a partnership to produce certain commodities such as the partnership among PT Pertani, PT Sang Hyang Seri and PT Pupuk Indonesia with the farmer groups in seven provinces (*North Sumatera, West Java, Central Java, East Java, West Kalimantan, Gorontalo and South*

*Sumatra*) (Pasaribu, 2015). In addition, partnership among enterprises and farmers to produce other vegetables commodities are also plenty discovered in some areas like PD Hikmah in Bandung district-West Java province and PT Unilever Indonesia in Bantul, Kulonprogo, Pacitan, Ngawi, Madiun for producing black soybeans as a raw material of soy sauce industry.

Aside from the formal partnership, there is likewise informal model as an ordinary relationship among farmers and enterprises. This model sometime referred to as intermediaries model in which they have their own informal arrangements. This model applies to individual entrepreneurs or small enterprises who make a simple contract with farmers for cultivating such particular crop as fresh vegetables.

#### **4. Mushroom Farming Partnership (The Experience of The Study)**

AAC enterprise is one of the pioneer on executing the model of the partnership for the business of mushroom farming. Improving its capacity to fulfill the demand of fresh mushroom product and engaging its local society for performing this farming as a simple and a new profitable business is the basic goal of their collaboration.

Table 10. Overview of AAC' mushroom farming partnership

Partnership duration	2004 – present
Product	Fresh oyster mushroom
Objective	Partnership for increasing the production and the delivery of domestic market access and technical support to farmers (adopters)
Services	Preparations - production aspects and market share
Main actor	Enterprise (AAC)
Partners	Local society (farmers)
Driver	AAC enterprise
Incentives	None

This mushroom partnership is an informal model by which there are no such public partners as government, financial institution supporting the performance of the partnership. Furthermore, there is no formal regulation which governs the selling price of the product. In

general, the selling price of the product from an informal model of partnership has been set by the enterprise including the mushroom partnership on the case of this study. Nevertheless, this model still delivers much benefit for both the enterprise and the adopters.

Table 11. The benefits, challenges and advantage of the mushroom farming partnership

Enterprise	<ul style="list-style-type: none"> <li>• increase the yield production of mushroom without having to cultivate baglog by its own resource to fulfill the demand</li> <li>• increase profits from baglog sales</li> <li>• social support brought in by the partners by inviting them to feasible business</li> </ul>
Farmers (adopters)	<ul style="list-style-type: none"> <li>• an appropriate business either for sideline or mainline</li> <li>• quality control, technical aspects of the farming, and market access will be supported by the enterprise</li> <li>• easy business as market distribution will be handled by the enterprise</li> </ul>
Challenge	<ul style="list-style-type: none"> <li>• difficult for the adopters to obtain maximum profit, the selling price refers to the price from conservative market</li> </ul>
Advantage	<ul style="list-style-type: none"> <li>• the enterprise does not depend on the supply from the farmers</li> <li>• there is no eligibility assessment to the farmers as the source of capital comes from themselves resulting a good commitment towards the partnership</li> </ul>

Partnerships need some requirements for achieving a sustainable collaboration. The primary requirements include (1) having a desire for commit into a business partnership, (2) capable of producing good quality products (Pasaribu, 2015). Therefore, the determination of partners/adopters is a very important matter in a partnership (Ferroni & Castle, 2011). However, the determination becomes easier when the capital comes from the adopters and the enterprise provides market only that means, in case of this study, AAC does not require the product supply from the adopters for other advanced productions. AAC only supports the marketing and the distribution of the product.

## 5. Beneficial Aspects of The Mushroom Farming Partnership

For smallholder farmers, many of the partnerships showed evidence of positive impacts on net income through improved market access, increased productivity, improved

product quality, and so on. One of the main challenge is the lack of guidance such as feasibility studies during the initial stages (FAO, 2016). In this case, right before they join with the partnership, AAC will provide a formulation of the business feasibility as requested. For example, the amount of the profit could be observed from the sample of the analysis below analyzed directly by AAC as shown on Table 12. AAC enterprise performing both the baglog production and mushroom cultivation will gain profit twice while the adopters will gain the profit from the cultivation.

Table 12. Sample result of the business feasibility analysis

Baglog production	Investment (IDR/cycle)	Operational cost (IDR)	Labor cost (IDR)	Gross income (IDR)	Net income (IDR)
30,000 baglogs	1,345,746	24,243,800	4,700,000	40,500,000	10,210,454

Assumptions:

- 1 cycle for baglog production = 35 days
- Production house capacity 30,000 baglogs
- Owned space
- Baglog selling price IDR 1,500/item
- Contamination rate <10%
- Price is in Cianjur distric area 2012

Mushroom cultivation	Investment (IDR/3years)	Operational cost (IDR)	Labor cost (IDR)	Gross income (IDR)	Net income (IDR/cycle)
30,000 baglogs	18,620,000	52,050,000	-	76,125,000	21,488,889

Assumptions:

- 1 cycle for mushroom cultivation = 5 months
- Baglog purchasing price IDR 1,500/unit
- Productivity 0,35 kg/baglog/cycle (5 months)
- Mushroom selling price within the partnership IDR 7,250/kg

---

IDR: Indonesian currency (Rupiah)

Table 13. The income of the adopters

Adopter	Net Income (IDR/cycle)	Adopter	Net Income (IDR/cycle)
1	21,488,889	16	46,201,111
2	71,629,630	17	21,488,889
3	28,651,852	18	30,084,445
4	23,995,926	19	22,921,482
5	25,070,371	20	39,396,297
6	35,814,815	21	23,136,370
7	32,233,334	22	23,637,778
8	22,921,482	23	23,637,778
9	27,219,259	24	31,875,185
10	42,977,778	25	25,070,371
11	28,651,852	26	31,875,185
12	35,814,815	27	23,637,778
13	23,637,778	28	25,786,667
14	23,279,630	29	25,070,371
15	38,178,593	30	21,488,889
<b>Average income</b>		<b>IDR 29.895,820</b>	

## CHAPTER IV

### GENERAL CONCLUSION AND RECOMMENDATIONS

#### 1. General Conclusion

The challenges towards the development of agriculture sector in Indonesia is not only questioning about transfer of skill, knowledge, good management and so on, but also attracting people to plunge into a business of agriculture. The mechanism of partnership has been used as an alternative strategy to handle such challenges including in small commodity like mushroom. This study attempts to evaluate and review the effectiveness of a partnership between a mushroom enterprise and the adopters then propose some recommendations. There are four main conclusions in this study as follows:

- 1) The partnership plays an important role to increase the fresh mushroom production capacity (*51.4% of the capacity from the enterprise and 48.6% from the adopters*) by engaging its local rural society.
- 2) The partnership provides market share and technical supports as a proper strategy in attracting new users to plunge into agribusiness. The partnership is aimed to the novices by countering the skepticism of production and market as well as offering a more reliable source of income.
- 3) Unlike formal partnership, this mushroom partnership owns several limitations such as: a limited diffusion, lack of access to funding support, and the set price is monotonous. This partnership may be recommended especially for rural society in three conditions indeed. First, at least have sufficient capital for the farming. Second, they must be novices who have no experience before and no market access. The third is that there must be no objection to the set price of the yield.
- 4) The three primary keys of characteristic allow this partnership to be possibly implemented without public partners support though such as from government and public banks.



## 2. Recommendations

The recommendations are given from the result analysis of the second chapter framed by innovation decision process framework. As mentioned before, the partnership has been operated successfully by the enterprise and the partners/adopters using their own initiative, and sure enough, the shortcomings are noticeable in most systems including this one. Therefore, these improvements are optional action that can be undertaken to improve the performance of the partnership and the adopters as well. The underlined points are tabulated into Table 14 as follows.

Table 14. The given points for improvement of the partnership and the adopters

Stage	Enterprise	Adopters	Government/Mass Media	Banking Services
<i>Knowledge</i>	Cooperation with local government and other parties to reach more potential adopters	-	Dissemination through extension programs or mass media or internet	-
<i>Persuasion</i>	-	-	Facilitates access to loans or credit subsidies	-
<i>Decision</i>	-	-	-	Provides simple credit access with low interest
<i>Implementation</i>	Provides and encourages baglog making training	Not only the scale but also focus on the skill and capability improvement in order to become a producer	Encourages farmers to improve their capability and facilitates access to loans or credit subsidies for scale improvement	Provides simple credit access with low interest
<i>Confirmation</i>	-	Prepare for taking on another diverse market to obtain more profit as an intermediate farmer or producer	-	-

To support the promotional efforts, government should focus more intensively by creating a cooperation with enterprises on the dissemination of the partnership through extension programs, and/or with mass media/internet to reach a wider range. Government and banking services may also cooperate in facilitating incentives and subsidized farm credit access to the partnership so that it can be accessed likewise by underprivileged.

A partnership is not invariably providing the optimal benefits. With the set price, when there will be increasing of the selling price, the adopters will gain a smaller profit compared to non-partnership farmers (Supriyati & Elizabeth, 2010). Partnerships are not automatically the right choice to solve every challenge in agriculture (Ferroni & Castle, 2011). Therefore, to get more profit, they should exit the partnership (*served as an intermediate farmer*) and move to other profitable markets. In addition, on the agreement of the partnership, a progressive commitment of the farming from the adopters feels necessary. The potential adopters must be encouraged improving their capability not only as a cultivator but also as a producer that having capability on baglog manufacture because the baglog (*artificial medium technology*) is the main key of this agribusiness development. As producer, they can seek for market destinations and will get the optimal price. Furthermore, another advantage of the producer is that trimming in operational cost used to purchase the baglog by saving nearly 34% per one cycle of cultivation.

## References

- Altalb, A. A. T., Filipek, T., & Skowron, P. (2015). The Role of Agricultural Extension in the Transfer and Adoption of Agricultural Technologies. *Asian Journal of Agriculture and Food Sciences*, 03(05), 500–507. Retrieved from <https://www.ajouronline.com/index.php/AJAFS/article/viewFile/2962/1680>
- Anderson, J. R., & Feder, G. (2004). Agricultural extension: Good intentions and hard realities. *World Bank Research Observer*, 19(1), 41–60. <https://doi.org/10.1093/wbro/lkh013>
- Arminsyurita. (2014). Analisis Strategi Pemasaran Jamur Rimba Jaya Mushroom. *Jurnal Ilmiah Ilmu Administrasi*, VI, Nomor(September), 156–168.
- Ashari. (2009). Peran Perbankan Nasional Dalam Pembiayaan Sektor Pertanian Di Indonesia. *Forum Penelitian Agro Ekonomi*, 27(1), 13–27. Retrieved from <http://ejurnal.litbang.pertanian.go.id/index.php/fae/article/view/3932/3269>
- Badan Pusat Statistik Kabupaten Cianjur. (2015). *Kabupaten Cianjur Dalam Angka 2015 (Cianjur Distric in Numbers 2015)*. Retrieved from [https://cianjurkab.bps.go.id/new/website/pdf\\_publicasi/Kabupaten-Cianjur-Dalam-Angka-2015.pdf](https://cianjurkab.bps.go.id/new/website/pdf_publicasi/Kabupaten-Cianjur-Dalam-Angka-2015.pdf)
- Barmon, B. K., Sharmin, I., Abbasi, P. K., & Mamun, A. (2012). Economics of Mushroom ( *Agaricus bisporus* ) Production in a Selected Upazila of Bangladesh. *The Agriculturalists*, 10(November), 77–89. Retrieved from <https://www.banglajol.info/index.php/AGRIC/article/view/13144>
- Beetz, A & Greer, L. (1999). *Mushroom Cultivation and Marketing, Horticulture Production Guide*. Retrieved from <https://www.mushroomcompany.com/resources/background/attramushroom.pdf>
- Bitzer, V., Glasbergen, P., & Arts, B. (2013). Exploring the potential of intersectoral partnerships to improve the position of farmers in global agrifood chains: Findings from the coffee sector in Peru. *Agriculture and Human Values*, 30(1), 5–20. Retrieved from <http://dx.doi.org/10.1007/s10460-012-9372-z>
- BPS Kabupaten Cianjur. (2016). *Kabupaten Cianjur dalam Angka 2016. Kabupaten Cianjur dalam Angka*. Retrieved from <https://cianjurkab.bps.go.id/index.php/publikasi/259>
- Carlsson, B., & Stankiewicz, R. (1991). On the nature, function and composition of

- technological systems. *Journal of Evolutionary Economics*, 1(2), 93–118. <https://doi.org/10.1007/BF01224915>
- Celik, Y., & Peker, K. (2009). Benefit/cost analysis of mushroom production for diversification of income in developing countries. *Bulgarian Journal of Agricultural Science*, 15(3), 228–237.
- Cheung, P. C. . (2010). The nutritional and health benefits of mushrooms. *Nutrition Bulletin*, 35, 292–299. Retrieved from <https://doi.org/10.1111/j.1467-3010.2010.01859.x>
- Dentoni, D., Bitzer, V., & Pascucci, S. (2016). Cross-Sector Partnerships and the Co-creation of Dynamic Capabilities for Stakeholder Orientation. *Journal of Business Ethics*, 135(1), 35–53. <https://doi.org/10.1007/s10551-015-2728-8>
- Dickson, K. E., & Hadjimanolis, A. (1998). Innovation and networking amongst small manufacturing firms in Cyprus. *International Journal of Entrepreneurial Behavior & Research*, 4(1), 5–17. <https://doi.org/10.1108/13552559810203939>
- Dirjen Hortikultura Kementerian Pertanian. (2015). Statistik Produksi Hortikultura Tahun 2014. *Statistik Produksi Hortikultura Tahun 2014*, 286. Retrieved from <http://hortikultura.pertanian.go.id/wp-content/uploads/2016/02/Statistik-Produksi-2014.pdf>
- Duffy, M. (2000). The internet as a research and dissemination resource. *Health Promotion International*, 15(4), 349–353. <https://doi.org/10.1093/heapro/15.4.349>
- Eaton, C., & Shepherd, A. W. (2001). *Contract Farming, Partnership for Growth*. FAO Agricultural Services Bulletin. Retrieved from [https://books.google.co.jp/books?hl=ja&lr=lang\\_en%7Clang\\_ja&id=K7qM\\_i8yj1sC&oi=fnd&pg=PR3&dq=joint+farming&ots=jb09wmG0l1&sig=zH1-kHDLDAhmYMHY18VDcL\\_VN0A#v=onepage&q=joint+farming&f=false](https://books.google.co.jp/books?hl=ja&lr=lang_en%7Clang_ja&id=K7qM_i8yj1sC&oi=fnd&pg=PR3&dq=joint+farming&ots=jb09wmG0l1&sig=zH1-kHDLDAhmYMHY18VDcL_VN0A#v=onepage&q=joint+farming&f=false)
- FAO. (2013). *Contract farming for inclusive market access*. (C. A. da Silva, And, & M. Rankin, Eds.). Rome. Retrieved from <http://www.fao.org/3/a-i3526e.pdf>
- FAO. (2016). *Public–private partnerships for agribusiness development: A review of international experiences*. (M. Rankin, E. G. Nogales, P. Santacoloma, N. Mhlanga, & C. Rizzo, Eds.). Retrieved from <http://www.fao.org/3/a-i5699e.pdf>
- Febrianda, R., & Laili, N. (2016). *Social Context Analysis to Developing Oyster Mushroom Business in Palembang City, South Sumatera, Indonesia (unpublished work)*.

- Feder, G., Just, R. E., & Zilberman, D. (1985). Adoption of Agricultural Innovations in Developing Countries: A Survey. *Economic Development and Cultural Change*, 33(2), 255–298. <https://doi.org/10.1086/451461>
- Feeney, M. J. (2011). Increasing Worldwide Consumption of Mushrooms: The Mushrooms and Health Global Initiative at Work. *The International Society for Mushroom Science*, (13), 2738–2747. Retrieved from <http://epub.cnki.net/grid2008/brief/detailj.aspx?filename=ZNYK201113013&dbname=CJFQ2011>
- Ferroni, M., & Castle, P. (2011). Public-private partnerships and sustainable agricultural development. *Sustainability*, 3(7), 1064–1073. <https://doi.org/10.3390/su3071064>
- Fontana, R., Geuna, A., & Matt, M. (2006). Factors affecting university-industry R and D projects: The importance of searching, screening and signalling. *Research Policy*, 35(2), 309–323. <https://doi.org/10.1016/j.respol.2005.12.001>
- Freel, M. S. (1999). Where are the skills gaps in innovative small firms? *International Journal of Entrepreneurial Behavior & Research*, 5(3), 144–154. <https://doi.org/10.1108/13552559910371095>
- Geels, F. W. (2005). Technological Transitions and System Innovations. Cheltenham, UK. <https://doi.org/https://doi.org/10.4337/9781845424596>
- Guo, H., Jolly, R. W., & Zhu, J. (2005). Contract Farming in China: Supply Chain or Ball and Chain? In *15th Annual World Food & Agribusiness Symposium*. IAMA, Chicago.
- Hartwich, F., Tola, J., Engler, A., González, C., Ghezan, G., Vázquez-alvarado, J. M. P., ... Verónica, M. (2008). *Building Public – Private Partnerships for Agricultural Innovation. World*. <https://doi.org/http://dx.doi.org/10.2499/9780896297715fsp4>
- Iriantinah, C. (2014). Strategi Pengembangan Komoditas Jamur Tiram Putih (Pleurotus Florida) Di Kabupaten Nganjuk. *Jurnal Manajemen Agribisnis*, 14(2).
- Kaldis, P., & Kontogeorgakos, D. (2002). Economic aspects of the emerging Greek mushrooms industry, 60–64. Retrieved from [http://newmedit.iamb.it/share/img\\_new\\_medit\\_articoli/212\\_60kaldis.pdf](http://newmedit.iamb.it/share/img_new_medit_articoli/212_60kaldis.pdf)
- KLHK. (2016). *Statistik Kementerian Lingkungan Hidup Dan Kehutanan Tahun 2016*. Indonesia.

- Kolk, A., van Tulder, R., & Kostwinder, E. (2008). Business and partnerships for development. *European Management Journal*, 26(4), 262–273. Retrieved from <https://econpapers.repec.org/RePEc:eee:eurman:v:26:y:2008:i:4:p:262-273>
- Lahman, O., & Rinker, D. L. (2002). Mushroom Practices and Production in Latin America : 1994-2002. *The International Society for Mushroom Science*, 16(1). Retrieved from <http://www.isms.biz/florida/volume-16-part-1-article-91/>
- Lelley, J. (1988). Growing Edible Mushroom – Still a Generally Neglected Opportunity. *Gate*, 4, 30–34.
- Mahajan, V. (1990). Determination of Adopter Categories by Using Innovation Diffusion Models, 37–50. Retrieved from [http://ink.library.smu.edu.sg/cgi/viewcontent.cgi?article=5121&context=lkcsb\\_research](http://ink.library.smu.edu.sg/cgi/viewcontent.cgi?article=5121&context=lkcsb_research)
- Marshall, E., Nair, (Tan).N.G. (2009). *Make money b y growing mushrooms*. Rome: Food and Agriculture Organization (FAO) of The United Nations. Retrieved from <http://www.fao.org/3/a-i0522e.pdf>
- Masakure, O., & Henson, S. (2005). Why do small-scale producers choose to produce under contract? Lessons from nontraditional vegetable exports from Zimbabwe. *World Development*, 33(10), 1721–1733. <https://doi.org/10.1016/j.worlddev.2005.04.016>
- Merriam-webster.com. (n.d.). innovation. Retrieved from <https://www.merriam-webster.com/dictionary/innovation>
- Nada, N., Ghanem, M., Msebah, S., & Turkiilmaz, A. (2012). Innovation and Knowledge Management Practice in Turkish SMEs. *Journal of Knowledge Management, Economics and InformationTechnology*, II(1), 248–265.
- Nugroho, Y. (2013). *Analisis SWOT Terhadap Strategi Pengembangan Bisnis Budidaya Jamur Tiram, Studi Kasus di Perusahaan Jamur di Kabupaten Bogor*. Gadjah Mada University. Retrieved from [http://etd.repository.ugm.ac.id/index.php?mod=penelitian\\_detail&sub=PenelitianDetail&act=view&typ=html&buku\\_id=65678](http://etd.repository.ugm.ac.id/index.php?mod=penelitian_detail&sub=PenelitianDetail&act=view&typ=html&buku_id=65678)
- OECD. (2014). *Public-Private Partnerships For Agricultural Innovation: Report On The Meeting Of The Food Chain Analysis Network*. Paris, France. Retrieved from [https://www.oecd-ilibrary.org/agriculture-and-food/public-private-partnerships-for-agricultural-innovation\\_5jm55j9p9rmx-en?crawler=true](https://www.oecd-ilibrary.org/agriculture-and-food/public-private-partnerships-for-agricultural-innovation_5jm55j9p9rmx-en?crawler=true)

- Pradhan, L., & Nayak, M. P. (2014). Issues and Opportunities in Spread of Mushroom Enterprise in Odisha. *Proceedings of the 8th International Conference on Mushroom Biology and Mushroom Products*, 623–626. Retrieved from <http://www.wsmbmp.org/2/90.pdf>
- Purnaningsih, N. (2006). *Inovasi Pola Kemitraan Agribisnis Sayuran di Provinsi Jawa Barat*. Bogor Agricultural University. Retrieved from <http://repository.ipb.ac.id/handle/123456789/40702>
- Rogers, E. (2003). *Diffusion of Innovations*. New York: Free Press (Vol. 5). <https://doi.org/10.1016/j.jmig.2007.07.001>
- Rosmiza, M., Davies, W., Aznie, R. C., Jabil, M., & Mazdi, M. (2016). Prospects for Increasing Commercial Mushroom Production in Malaysia: Challenges and Opportunities. *Mediterranean Journal of Social Sciences*, 7(1), 406–415. <https://doi.org/10.5901/mjss.2016.v7n1s1p406>
- Royer, A., Bijman, J., & Abebe, G. K. (2017). Cooperatives, partnerships and the challenges of quality upgrading: A case study from Ethiopia. *Journal of Co-Operative Organization and Management*, 5(1), 48–55. <https://doi.org/10.1016/j.jcom.2017.04.001>
- Sahat M Pasaribu. (2015). Program Kemitraan dalam sistem pertanian terpadu. *Analisis Kebijakan Pertanian*, 13(1), 39–54. Retrieved from <https://media.neliti.com/media/publications/57529-ID-program-kemitraan-dalam-sistem-pertanian.pdf>
- Schilling, M. A. (2012). *Strategic Management of Technological Innovation* (4th Editio). McGraw-Hill/Irwin.
- Schumpeter, J. A. (1934). *The Theory of Economic Development*. Cambrige: Cambrige, Harvard University Press.
- Supriyati, & Elizabeth, R. (2010). *Pengembangan Kemitraan Usaha Yang Saling Menguntungkan : Kasus Antara Pt . Heinz Abc Indonesia Dengan Petani Cabai Merah Di Jawa Tengah Development Of A Mutual Beneficial Business Partnership : A Case Between Pt Heinz Abc Indonesia And Chili Farmers In Ce*. Retrieved from [http://pse.litbang.pertanian.go.id/ind/pdf/files/Pros\\_MP\\_09\\_2010.pdf](http://pse.litbang.pertanian.go.id/ind/pdf/files/Pros_MP_09_2010.pdf)
- Tidd, J., Bessant, J., & Pavitt, K. (2005). *Managing Innovation: Integrating Technological, Market and Organizational Change*. Chichester and New York: NY: J. Wiley.

- Ton, G., Vellema, W., Desiere, S., Weituschat, S., & D'Haese, M. (2018). Contract farming for improving smallholder incomes: What can we learn from effectiveness studies? *World Development*, 104, 46–64. <https://doi.org/https://doi.org/10.1016/j.worlddev.2017.11.015>
- Wayan, N., Rusadi, P., Susrusa, K. B., & Ap, I. G. S. (2015). Hubungan Antara Jiwa Kewirausahaan dan Manajemen Agribisnis terhadap Keberhasilan Usaha Jamur Tiram di Kota Denpasar Pendahuluan. *Jurnal Manajemen Agribisnis*, 3(2), 134–146. Retrieved from <https://media.neliti.com/media/publications/26300-ID-hubungan-antara-jiwa-kewirausahaan-dan-manajemen-agribisnis-terhadap-keberhasila.pdf>
- Youri, M. R., Tano-Debrah, K., Obodai, M., & Smith, J. F. (2004). Bioconversion of some agro-processing waste through *Pleurotus* production. *Mushroom Science*, 16(Science and Cultivation of Edible and Medicinal Fungi), 599–609. Retrieved from <http://www.isms.biz/florida/volume-16-part-1-article-79/>
- Zakaria, F. (2015). *Pola Kemitraan Agribisnis*. Ideas Publishing.
- Zhang, Y., Geng, W., Shen, Y., Wang, Y., & Dai, Y. C. (2014). Edible mushroom cultivation for food security and rural development in China: Bio-innovation, technological dissemination and marketing. *Sustainability (Switzerland)*, 6(5), 2961–2973. <https://doi.org/10.3390/su6052961>



## Supplementary data

### Interview guideline (chapter 1)

- i. Could you tell the background of your enterprise?
- ii. What were the challenges of your enterprise?
- iii. What strategy/innovation you made to overcome the challenges?
- iv. How many types of that strategy?
- v. Why you made that strategy?

#### 1. Actors and network

- How many actors/parties supporting the system of your strategy?
- What were their respective roles in that system?

#### 2. Institutions

- What were the customs, established practices, or standards within your enterprise making you could create that strategy?
- What were the customs, established practices, or standards of the other actors supporting you could create that strategy?

### Interview guidelines (chapter 2)

Name of respondent:

Age\*:

Education level\*:

(\*when adoption was taken)

A. Prior condition	<ul style="list-style-type: none"><li>• What was your job before taking a partnership on mushroom farming?</li><li>• What were your needs and problems making you adopted this partnership?</li></ul>
B. Knowledge stage	<ul style="list-style-type: none"><li>• When did you get the information about this partnership?</li><li>• Who gave you the information about this partnership?</li><li>• What did you know initially about this partnership?</li><li>• Was it difficult to understand the information about it?</li></ul>
C. Persuasion stage	<ul style="list-style-type: none"><li>• In trying to get the detail information, who was your source?</li><li>• What are your opinions about the strengths and weaknesses of this partnership?</li><li>• What are the details of the information?</li></ul>
D. Decision stage	<ul style="list-style-type: none"><li>• What/who was your background/trigger making you adopt this partnership?</li><li>• When did you decided to adopt it? How long was it since you initially hear it?</li></ul>

	<ul style="list-style-type: none"> <li>• What did you prepare for the decision?</li> </ul>
E. Implementation stage	<ul style="list-style-type: none"> <li>• What did you do for and during implementation?</li> <li>• What was your scale initially?</li> <li>• What was your scale recently? Or your maximum scale?</li> </ul>
F. Confirmation stage	<ul style="list-style-type: none"> <li>• What were your positive/negative aspects of this partnership?</li> <li>• What were your evaluation/issues during/after implementation?</li> </ul>

## **CURRICULUM VITAE**

Full Name	Rendi Febrianda
Place of Birth	Jakarta, Indonesia
Date of Birth	19 February 1986
Nationality	Indonesia
Occupation	Researcher
Institution	Indonesian Institute of Science, Center for Science and Technology Development Studies, Jakarta, Indonesia (PAPPIPTEK LIPI)
Email	rendi.febrianda@yahoo.com
Education	<p>Bachelor Degree: Gadjah Mada University, Faculty of Agriculture Technology</p> <p>Master Degree: Sriwijaya University, Faculty of Agriculture</p> <p>Doctoral Degree: Mie University, Faculty of Bioresources</p>

## **ACKNOWLEDGMENTS**

I would like to give a special thanks to Prof. Hiromi Tokuda as my supervisor for his valuable guidance, constructive criticism, hearted supports and continuous encouragement during the study.

My appreciation is addressed to the examiners for their criticism and all staffs of Bioresources Faculty and Mie University International Office for their assistance and supports during the completion of my study and this thesis.

Special thanks are also given to my big family, my colleagues, and my friends for their great love, support and encouragement.

Rendi Febrianda