This is to certify that the
dissertation entitled

ADOPTION OF ORGANIC VEGETABLE PRODUCTION
PRACTICES IN WEST JAVA AND BALI, INDONESIA

presented by

CHIFUMI TAKAGI

has been accepted towards fulfillment
of the requirements for the

Ph.D. degree in Community, Agriculture, Recreation, and Resource Studies

Allmai Suzuki

Major Professor's Signature

May 12, 2010

Date

ADOPTION OF ORGANIC VEGETABLE PRODUCTION PRACTICES IN WEST JAVA AND BALI, INDONESIA

By

Chifumi Takagi

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of requirements
for the degree of

DOCTOR OF PHILOSOPHY

Community, Agriculture, Recreation and Resource Studies

2010

ABSTRACT

ADOPTION OF ORGANIC VEGETABLE PRODUCTION PRACTICES IN WEST JAVA AND BALI, INDONESIA

by

Chifumi Takagi

One of the challenges in developing organic agricultural production in Indonesia is increasing farmers' knowledge of organic farming methods to grow high quality organic products. Recognizing the need for research and development of organic agriculture, the Development of New Bio-Agents for Alternative Farming (DNBAF) project established pilot farms in West Java and Bali in 2005 in order to field test the use of bio-pesticides and compost. Since lack of extension is a constraint in developing organic agriculture in Indonesia, it is important to understand what factors determine 1) farmers' knowledge of organic farming methods, 2) their attitudes toward such methods, and 3) their adoption of the methods. The goal of this study was to determine farmers' perceptions of organic vegetable production practices including bio-pesticides and compost in West Java and Bali, Indonesia. The following hypotheses were tested in this study: (1) socio-economic variables will affect the familiarity with bio-pesticides and compost. The socio-economic variables are: respondent's location, gender, age, education level, household size, number of family laborers, farming experience, farm size, distance to the pilot farm, irrigation sources, land tenure status, net revenue of cabbage, tomato, carrot production, exposure to the pilot farm and any information source groups (media, extension, farmer and commercial groups); and (2) farmers' familiarity with the target organic vegetable practices will affect farmers' attitude toward target organic methods,

and it will be possible to increase the chances that the farmer will adopt organic farming by changing his/her attitudes toward the target organic methods.

Data were collected using a mixed method: face-to-face survey and interviews with key informants. In the face-to-face survey, a total of 627 households of vegetable farmers surrounding the pilot farms in West Java and Bali constituted the population, and 210 farmers selected by a systematic random sampling method were interviewed. The study hypothesis (1) was tested by a binary logit analysis, and hypothesis (2) was tested by a path analysis. In the interviews with key informants, a snowball sampling was used to collect detailed information from persons representing the Department of Agriculture, the agricultural extension agency, and people in an organic vegetable market channel in the study sites. A total of 10 people from the three groups were interviewed by the researcher in Bahasa Indonesia.

Result of the binary logit analysis showed that the factors associated with awareness of the practices include: location, gender, educational level, distance to the pilot farms, exposure to the pilot farms, and information sources. However, results of the path analysis showed no statistically significant relationships between awareness of the practices, attitude toward the practices, and intention to adopt the practices. The results of interviews with key informants indicated that the following factors limit acceptance of organic farming: 1) limited interaction with extension agents; 2) limited contact between farmers and consumers; 3) lack of enforcement of standards for organic produce; 4) the high cost of certifying produce as organic; and 5) weather conditions, especially long dry seasons and excessive precipitation during the rainy season, which makes control of diseases difficult.

ACKNOWLEDGMENTS

I would like to express my deep appreciation to following people who support my dissertation study and academic life at Michigan State University.

First, I am especially grateful to my major advisor, Dr. Murari Suvedi. Without his supervision, mental and financial support, I would not have completed my degree here. My deep gratitude extend to my advisory committee members including, Dr. Richard Bernsten, Dr. Richard Paulsen and Dr. Russell Freed. I would like to emphasize that all of my committee members had rich international research experiences in developing countries, which made me the recipient of very useful and practical advice during my dissertation. I really appreciate their concerns and supports of my professional development.

Second, I am deeply grateful to Dr. Akimi Fujimoto, who is a leader of the Development of New Bio-Agents for Alternative Farming project at Tokyo University of Agriculture. He provided the research opportunity for my dissertation using this project, and financial support for my fieldwork in Indonesia. During the fieldwork, several Indonesian faculty members who were involved in the project supported my fieldwork. Especially, I would like to express my special appreciation to Dr. Yusman Syaukat at Bogor Agricultural University and Dr. I Made Sudana at Udayana University.

Third, I must thank vegetable farmers in the Sukagalih village in West Java and Bangli village in Bali for their warm hospitality and unconditional cooperation to my study. I was able to complete my research because of their kindness and supports.

Fourth, I would like to express my deep appreciation to Drs. Frank and Katherine Dennis for providing lesson in English language. Since the summer of 2004, I have studied English with Dr. Katherine Dennis. Dr. Dennis also gave me useful advice to improve my academic writing skills.

Finally, I would like to say "thank you very much" for my colleagues with whom I studied in the Department of Agricultural Economics and the Department of Community, Agriculture, Recreation and Resource Studies at Michigan State University. I make mention here of Chirs Wight, Maria Laura Donnet, Sindi Kirimi and Lilian Kirimi, Honglin Wang, Woohyan Shim, Hikuepi Katjiuonguan, Wolfgang Pejuan, Tracy Beedy, Tomokazu Nagai, Satoshi Tsukamoto, Eric Bailey, Lourdes Martinez, Sung Hee Park, Chi-Ming (Allen) Hsieh, Mi Ran Kim, Gwo-Bao Liou, Kaoruko Miyakuni, Eunice Cavane and Kana Aoki. It would have been difficult to complete my degree without their kindness and supports. I will continue to value our shared experiences and treasure our friendships. Also I must say "thank you very much" to my husband, Toshiji Takagi and my parents, Masao and Teruko Takagi. They provided me the blessing and support to pursue my academic and professional goals. Again, thank you very much.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

Indonesia is well-known as an agricultural country. In 2008, more than 41 percent of the working population was engaged in agriculture. Agriculture accounted for 14.4 percent of the gross domestic product (GDP), with 4,954 trillion Indonesian rupiah (Rp.), second only to the industrial sector, with 27.9 percent (Badan Pusat Statistik, 2009). Approximately 59 percent of the land was in agricultural production, including rice (14.2 percent), large foreign-owned or privately owned estates (25.1 percent), as well as vegetables, fruits, staples and cash crops (19.4 percent) (Badan Pusat Statistik, 1999). Most of the cash and the estate-grown crops, including rubber, tobacco, coffee, tea, sugar, and palm oil were exported to the United States, Japan, Singapore, Malaysia, United Kingdom, Netherlands, Germany and Belgium. In recent years, rice was imported mainly from Thailand, India, China, and Vietnam (U.S. Embassy Jakarta, 2006; FAO, 2009).

Vegetables are an important agricultural sub-sector in Indonesia. In the highlands (> 800 meters altitude) vegetables dominate; in the lowlands (< 200 meters altitude) rice, corn, cassava, fruits and cash crops dominate (Johnson, et al., 2008). Vegetable production has great potential for increasing the income of small-scale farmers. Indonesian agricultural policy has focused on self-sufficiency and import minimization, with emphasis on the strategic commodities of rice, sugar, corn, and soybeans. This strategy is not economically productive for small-scale (0.5 hectare) farmers. The best strategy for increasing income is to promote high-income options, including vegetable production (Molyneaux and Rosner, 2004). From a consumption perspective, vegetables are an important part of Indonesian diets. They are usually spiced and served as the main meal with rice, as ingredients in soup, and as sambals, which are spicy condiments made with chili and shallot. In addition, the majority of the Muslim community requires halal foods, including vegetables, to conform to Muslim dietary laws (Johnson, et al., 2008). Agricultural extension services could be instrumental in promoting vegetable production.

Agricultural extension in Indonesia is defined as "a non-formal education system for farmers and their families (men and women) aiming at assisting them in enhancing better rational and technical skills, as well as increasing knowledge, developing more positive attitudes toward change and self reliance in managing their farming, business and living" (Zakaria, 2003; p. 3). Goals of the extension system are to develop agribusiness systems, improve agribusiness efficiency and productivity in order to increase farmers' income, and improve their welfare. The system consists of four sub-systems: agricultural research and development, agricultural education, agricultural training, and agribusiness and agricultural extension education (Zakaria, 2003). All of the sub-systems were formerly under the Ministry of Agriculture (Mundy, 1992). However, after decentralization in Indonesia in the 1990s, private sector and civil societies were involved in the extension system (Zakaria, 2003). Historically, the golden era of agricultural extension in Indonesia was the Green Revolution program. Agricultural extension played a pivotal role in increasing production of rice (Mundy, 1992).

Green Revolution farming practices supported by the government – including the use of improved seeds, application of agrichemicals and development of irrigation systems – became the mainstream model of agriculture in Indonesia in the 1970s. Traditional farming methods disappeared in many parts of the country, especially in Java (Prawoto and Suyono, 2005). Indonesia temporarily achieved self-sufficiency in rice in

1984 (Nourin Tokei Kyokai, 1995; Mundy, 1992). With continuing economic growth, Indonesian consumption patterns have changed; consumption of rice and other staples has declined, while consumption of fruits, vegetables, and prepared food has increased. Rising income, urbanization, and greater participation in the workforce encouraged the use of ready-prepared ingredients and ready-to-eat meals, including vegetables (Johnson, et al., 2008). Vegetable production increases from 1984 to 1994 resulted from the use of better seeds and technologies (Darmawan and Pasandoran, 2000). However, pesticide use was excessive, fertilizer use imbalanced, and organic matter inputs drastically below levels required to maintain healthy soils (Darmawan and Pasandoran, 2000; Hilman et al., 1990).

Although the agricultural extension system played an important role in the development of agriculture in Indonesia, lack of sufficient management and the huge institutional inertia of a large extension bureaucracy considerably weakened the system. Because of weakening financial and technical support, extension services virtually collapsed (Sulaiman and Hall, 2004). In the 1990s, the Ministry of Agriculture moved toward decentralization to ensure effectiveness, increase accountability to farmers, and be less costly to the government. Many districts dissolved their old extension systems and set up new extension structures based on the needs of regional farming conditions (Zakaria, 2003). As a result of the decentralization, the elimination of governmental subsidies reduced the use of chemical fertilizers and pesticides, and boosted interest in integrated pest management (IPM) and non-chemical alternative technologies, such as organic farming (Johnson, et al., 2008).

Organic agriculture is defined by the Secretariat of the Joint FAO/WHO Food Standards Program (Codex CAC-GL 32/1999) as "holistic production management systems which promote and enhance agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity. It emphasizes the use of management practices in preference to the use of off-farm inputs, taking into account that regional conditions require locally adapted systems. This is accomplished by using, where possible, cultural, biological and mechanical methods, as opposed to using synthetic materials, to fulfill any specific function within the system" (p.3). In Indonesia, organic agriculture was started in the early 1980s by non-governmental organizations (NGOs) collaborating with small farmers (Surono, 2007). After the monetary crisis in 1997, many farmers switched to organic methods because of the soaring cost of agricultural inputs (Prawoto and Suyono, 2005). In 2001, recognizing the need for organic agriculture, the Ministry of Agriculture established a program, entitled "Go Organic 2010," and a National Standard for Organic Food (SNI 01-6729-2002), adopted from the Codex CAC-GL 32/1999, was issued in 2002 (Novianty and Andoyo, 2008). In 2007, the Ministry of Agriculture officially initiated the organic agriculture program, with a budget of approximately $4 million U.S. Most of these funds were used for technical development of organic agriculture (Surono, 2007), rather than for research and development (Prawoto and Suyono, 2005).

In general, the three main components of a sustainable agricultural system, including organic agriculture, are eliminating the use of: 1) pesticides and fungicides to control pests and diseases; 2) herbicides to control weeds; and 3) chemical fertilizers (Yamazaki, 2005). According to Kawai, et al. (2003) and Dadang, et al. (2005), establishing a control system which does not depend on insecticides was required for organic vegetable production in West Java and Bali. Also, Narioka, et al. (2001) indicated that appropriate soil management was needed to achieve sustainable farming in Bali. However, there was insufficient research-based information to provide guidelines for use in regional extension centers in West Java and Bali.

Recognizing the need for research and development, the Tokyo University of Agriculture (TUA) initiated a research-cum demonstration project in 1999, in cooperation with Bogor Agriculture University and Udayana University of Indonesia. The goal of the project, known as Development of New Bio-Agents for Alternative Farming (DNBAF), was to develop bio-pesticides to promote sustainable farming systems (TUA, 2005). Several bio-pesticides were developed during the project period (Dadang, et al., 2005; Sumiartha, et al., 2005; Sudana, et al., 2003). In January of 2005, the DNBAF project set up organic vegetable pilot farms in two sites – West Java and Bali – in order to field test the use of bio-pesticides and compost. At both research sites, farmlands were rented in the local villagers, and local farmers were hired to operate the pilot farms as instructed by the project researchers. Workshops and training seminars were conducted to disseminate organic farming methods to the farmers in July 2007 in West Java and in September 2007 in Bali. Information about the pilot farms is summarized in Appendix B.

Problem Statement

One of the challenges in developing organic agriculture in Indonesia is increasing farmers' knowledge of organic farming methods to grow high quality organic products (Surono, 2007). As a result of an agricultural extension process, farmers may adopt a new technology. The farmers may obtain enough knowledge of the technology through communication and education processes. Through these processes, farmers will form an attitude toward the technology, and can decide whether they will adopt the technology or not. If the farmers decide to adopt the technology, it will be implemented. Since lack of extension is a constraint in developing organic agriculture in Indonesia, it is very important to understand what factors determine 1) farmers' knowledge of organic farming methods, 2) their attitudes toward such methods, and 3) their adoption of the methods. However, until 2007, no systematic technology adoption study of the organic conversion process had been conducted in Indonesia.

Since the DENBAF project is an example of organic conversion, this study investigated farmers' perceptions of organic farming methods, including use of bio-pesticides and application of composts in the DENBAF project sites in West Java and Bali. The study was conducted in communities surrounding the model farms. It examined two organic vegetable production practices, the application of biological insecticides (bio-pesticides), and the use of organic fertilizers (compost) on three vegetable crops – cabbage, tomato, and carrot. These were the major vegetables grown in these areas, and the selected technologies were being tested on the pilot farms.

Research Objectives

The overarching goal of this study was to determine farmers' perceptions of organic vegetable production practices, including bio-pesticides and compost, in West Java and Bali, Indonesia. Specifically, the objectives of this study were to:

1. Describe vegetable production systems, including the target vegetables (cabbage, tomato and carrot) in the study sites.
2. Determine demographic-socio-economic characteristics of the respondents in the

study sites.

3. Ascertain farmers' awareness of the target organic vegetable production practices, including the application of bio-pesticides and the use of compost.
4. Ascertain farmers' attitudes towards these practices.
5. Find out if farmers in the area had adopted these practices or intended to adopt them in the near future.
6. Determine the factors associated with awareness of these practices.
7. Determine the impact that awareness and attitude had on vegetable farmers' decision to adopt, or intention to adopt, these practices.
8. Ascertain farmers' constraints, if any, in converting from conventional to organic vegetable farming in the study sites.

Importance of the Study

The findings from this study provide valuable information to project staff and extension educators as to the level of awareness farmers had of bio-pesticide and compost, and the impact this awareness had on their decision to adopt the practices. For potential organic farmers, this study introduces current organic farming policy, activities of extension agents related to organic farming, and market opportunities for organic vegetables. It also provides useful information for future DNBAF projects and for Indonesian agricultural extension agents in planning how to disseminate the technology developed by the DNBAF project to potential organic farmers in Indonesia.

Definition of Terms

Bio-pesticides: Plant/fungal/bacterial extracts used to control insects and pests in vegetable production. For example, extract mixtures of *Swietenia mahogany* and *Aglaiaodorata* to reduce the larval population of *Plutella xylostella* (L.)(Lepidoptera:Yponomeutidae), which is a major insect pest on cabbage (Dadang et al. 2005); use of Selasih oil can be an effective bio-agent to control fruit fly population on long chili fields (Sumiartha et al. 2005).

Compost/bokashi: In Indonesia, organic material mainly used to supplement nutrients to plants. Cow dung, chicken manure and "bokashi", a product of waste plant material fermented by microorganisms, are used to make compost.

Chapter II

LITERATURE REVIEW

This chapter presents the review of literature on agricultural development in the developing countries. The first section introduces issues facing agricultural development and the role of agricultural extension. Then the extension system in Indonesia is discussed briefly. The next section describes the adoption-diffusion processes as they relate to organic vegetable production. A conceptual model on the adoption of organic vegetable production is presented and study hypotheses are discussed.

Agricultural Development in Developing Countries – Current Issues

The study of agricultural development in developing countries started in the 1950s. At that time, most Western agricultural practitioners assumed that agricultural technology and models of agricultural extension could be directly transferred from high income countries to low-income countries to increase farmers' agricultural productivity and overcome rural poverty. In many extension programs, the American model of agricultural extension was successfully implemented in developing countries (Holdcroft, 1984; Staatz and Eicher, 1998). However, many of the extension programs failed, leading to a reevaluation of the applicability of the American model. Through this reevaluation, two critical issues were raised. First, there were structural barriers, such as highly concentrated political power and asset ownership in developing countries (Staatz and Eicher, 1998). Second, Schultz (1964) indicated that farmers were "efficient but poor," given existing agricultural technologies. Schultz assumed if farmers obtained new agricultural technologies or materials and the means to exploit them, then productivity would increase. Thus, investments in agricultural research to develop new technologies and in human capital, such as agricultural extension education, were needed to increase agricultural productivity (Staatz and Eicher, 1998).

In 1971, the Consultative Group on International Agricultural Research (CGIAR) was established to reduce poverty, foster human well-being, promote agricultural growth and protect the environment. CGIAR membership includes international and regional organizations, and 15 international agricultural centers supported by private foundations, international organizations and governments (CGIAR, 2006). The International Rice Research Institute (IRRI) in the Philippines and the Centro International de Mejoramiento de Maizy Trigo (CIMMYT) (International Maize and Wheat Improvement Center) in Mexico are members of CGIAR, and contributed to increased food production through scientific research and research-related activities in the field of agriculture. As a result of IRRI's and CIMMYT's success in developing high-yielding varieties of rice, corn and wheat, many farmers adopted these varieties, and cereal productivity increased rapidly in Asia (the "Green Revolution"). In this case, agricultural practitioners sought a better understanding of the factors that influenced farmers' decision-making when they adopted new varieties and farming practices (Staatz and Eicher, 1998).

The 1980s and 1990s were an era of globalization of the world economy and institutional restructuring of economies throughout the world. While the economy improved, environmental problems such as acid rain and pollution increased simultaneously worldwide (Staatz and Eicher, 1998). The Green Revolution contributed to increased grain production in Asia, but its technical package (use of irrigation systems, improved varieties and agrichemicals) resulted in negative impacts on the environment, such as soil erosion and agrichemical pollution (Fujimoto and Matsuda, 2005).

Agricultural practitioners have sought alternative agricultural systems for sustainable agriculture in terms of economy, society and environment, such as Integrated Pest Management (IPM) and Low-External-Input Sustainable Agriculture (LEISA). However, these alternatives should be adapted to the climate, soil, topography and bio-physical factors of a given region. The adequacy and economic efficiency of these alternative technologies have not been studied and evaluated fully in developing countries (Crucefix, 1998; Smalley, 2000).

The Role of Agricultural Extension in Developing Countries

Agricultural extension does not have a monolithic structure. According to Swanson and Claar (1984), "extension is an ongoing process of disseminating useful information to people (the communication dimension) and then helping those people acquire the necessary skills and attitudes to utilize this information or technology effectively (the educational dimension)." Given these factors, the term "agricultural extension" was defined by Maunder (1973) as " a service system which assists farm people, through educational procedures, in improving farming methods and techniques, increasing production efficiency and income, bettering their levels of living, and lifting the social and educational standards of rural life." Therefore, agricultural extension is an essential and major part of transfer of technology (Swanson and Claar, 1984).

Agricultural extension has played an important role in disseminating new agricultural knowledge and technology to rural people. In the 1950s, due to previous colonial policies, many extension services focused on export crops such as coffee, rubber, sugar, palm oil, and tea (Antholt, 1998). Western extension advisors flooded developing countries with foreign aid programs and Western agricultural technologies. Although the

1950s were called the "golden age of extension" (Britan, 1985), many extension programs failed because it was assumed that Western technology and models of extension could be directly transferred to developing countries to increase productivity. Western extension advisors had a high degree of confidence that Western technologies could solve the problems of poverty through improved production (Evenson, 1984; Antholt, 1998).

In the 1960s and 1970s, the failure and subsequent reevaluation of many extension programs led to changes in extension that emphasized investment in research and human capital. In order to improve the effectiveness of conventional extension organizations, high-yielding varieties of rice, corn and wheat were developed by IRRI and CIMMYT, and the training and visit (T&V) approach to extension management was introduced by Daniel Benor in 1967. The clientele of the T&V approach are all farmers, and some progressive farmers from each community are selected as contact farmers. The contact farmers have access to resources and inform other small farmers in the community of the new agricultural knowledge and technology taught by extension workers. The extension workers visit the contact farmers of each community at regular intervals, assess progress, and provide needed support. Through these activities, new knowledge and technology can reach all farmers in the community (Benor 1987; Swanson and Claar, 1984). The World Bank supported the T&V approach to improving existing extension systems, and committed between $3 and $4 billion US to extension projects in developing countries from 1977 to 1992 (Anderson and Feder, 1994; Antholt, 1998).

The T&V approach was used and modified for extension in the 1980s. However, there are four major criticisms of the T&V model. First, the model is too rigid to work appropriately, given the variation in cultural, historical, and institutional factors among countries. Second, its management is too top-down oriented and does not accommodate the various demands and needs of farmers. Third, it is too labor-intensive, requiring numerous extension workers with knowledge and skill in agriculture, so that a country may not be able to afford it. Fourth, the contact farmers no longer play a key role in transfer of new knowledge and technology; farmer groups serve this function instead (Antholt, 1998; Swanson and Claar, 1984; World Bank, 1994). Kearl (1991) and Antholt (1998) stated that the T&V model is no longer the central model, and should be replaced by new extension models for the 21st Century.

In order to develop new extension models in developing countries, Chambers (1983) suggested that more attention should be given to the client, the "farmer first" approach of developing appropriate technology. Also, Umali-Deininger (2005) indicated that there is no "one size fits all" solution in agricultural extension. For example, a few developed countries such as Australia, the Netherlands and the United Kingdom have fully private extension systems, and the extension system in the United States has been developed and organized by land-grant universities. Some developing countries such as India, Indonesia and Ghana have transferred responsibility for decision-making and administration of extension service functions from the central government to local government to increase the efficiency of the system, but the degree of decentralization varies according to conditions within the country (Umali-Deininger, 2005).

Therefore, it is important to take into account the specific conditions of a country in terms of politics, economics, history, culture, and natural environment in order to establish an appropriate extension model.

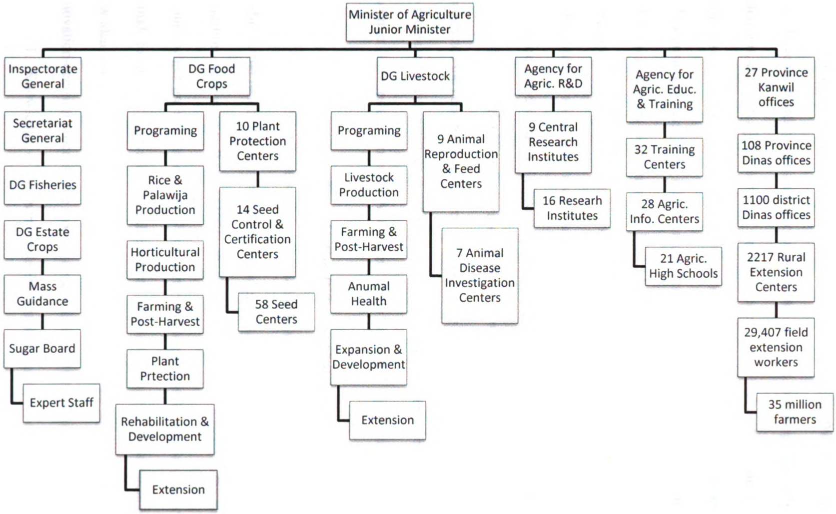
The Agricultural Extension System in Indonesia

Indonesia's agricultural research and extension systems were large and complex. The extension function belonged to the Ministry of Agriculture (Figure 1). Mundy (1992) mentioned that the Agency for Agricultural Education and Training (AAET) mainly functioned as extension. However, the extension function was never fully unified under one body, and it was returned to four directorates-general for food crops, livestock, estate crops, and fisheries. AAET coordinated and managed Indonesia's agricultural information and training institutions. These included agricultural high schools, Agricultural Staff Training Centers (*Balai Latihan Pegawai Pertanian)*, and Agricultural Information Centers (AICs, *Balai Informasi Pertanian)*. The AICs were keys to the flow of information on new agricultural technologies (Mundy, 1992).

The Ministry of Agriculture operated an array of provincial and district technical units to oversee and implement different aspects of its work. These were provincial coordination offices (*Kantor Wilayah)*, and provincial and district-level Agricultural Service offices (*Dinas*). Those were responsible administratively and technically to the regions. Under these regional offices, rural extension centers were placed, and field extension workers provided useful information for farmers in the centers. According to the Ministry of Agriculture (as sited in Mundy, 1992), there were 29,407 field extension workers in 1991. These large and complex systems led to inefficient communication between extension organizations and farmers (Mundy, 1992).

Historically, Indonesia implemented the T&V system for extension in the late 1970s with World Bank sponsorship (Benor and Harrison, 1977). Under this system, extension subject-matter specialists (*Penyuluh Pertanian spesialis*) train field extension workers (FEW, *Penyluh pertanian lapangan*) in seasonally relevant material at regular fortnightly training sessions. A FEW is assigned to several villages, and visits each village once every two weeks. FEWs work with groups of contact farmers (*kontak tani*) in each village. In turn, these contact farmers are expected to disseminate their knowledge to follower farmers in their village (Mundy, 1992).

Even though the T&V system contributed to increased rice production (Mundy, 1992), the lack of sufficient preparation on the part of the T&V system management and the huge institutional inertia of large extension bureaucracies have considerably weakened the system. As a result, extension services virtually collapsed because of weakening financial and technical support (Sulaiman and Hall, 2004). In the 1990s, the government of Indonesia was moving toward decentralization. Major steps have been taken to decentralize agricultural extension. In 1991 a joint decree between the Ministry of Agriculture and Ministry of Home Affair was released to expand the roles of district government and agricultural services to manage extension activities at district level. The goals of the decree were to ensure effectiveness, be more accountable to clients, and be less costly to the government (Zakaria, 2003).



Source: Mundy, 1992, page 24.

Figure 1. Structure of the Indonesian Ministry of Agriculture and Extension in 1991

As a result of enforcement of Public Law No. 22/1999 in 1999, every district could have the freedom to establish organizational structure to manage agricultural extension, although a joint decree of the Minister of Agriculture and Minister of Home Affair issued earlier directed district governments to establish agricultural information and extension centers (Balai Informasi dan Penyuluhan Pertanian, BIPP) at a district level and Rural Extension Center at a sub-district level. Many districts dissolve the BIPP and set up new extension structures, based on the needs of regional farming conditions. Consequently, various structures of agricultural extension institutions were established at district and sub-district level (Zakaria, 2003). In 2006, the Law No.16/2006 on Extension Systems for of Agriculture, Fisheries and Forestry was finally passed. The law explicitly recognized the need for a multi-provider system for the delivery of agricultural services to increase the competitiveness of the Indonesian agricultural sector and increase farmers' incomes (Indonesian Center for Agriculture Socio Economic and Policy Studies, 2008).

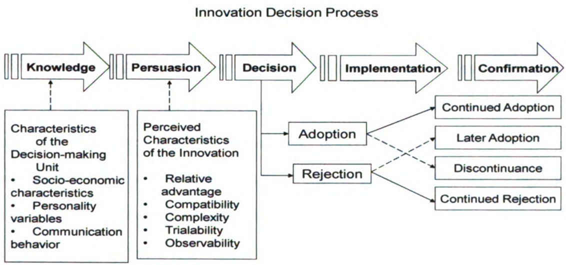
The Adoption/Diffusion Model

Rogers (1995) developed the adoption/diffusion model based on several research studies in the fields of communication, anthropology, rural sociology, and extension education. According to Rogers (1995), the innovation-decision process is the process through which an individual passes from first knowledge of an innovation, to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision. Figure 2 shows a model of stages in the innovation-decision process. The model was consisted of five stages:

1. Knowledge — a person (or decision-making unit) becomes aware of an

innovation and gains some understanding of how it functions.

2. **Persuasion** — a person (or decision-making unit) forms a favorable or unfavorable attitude toward the innovation.
3. **Decision** — a person (or decision-making unit) engages in activities that lead to choice to adopt or reject the innovation.
4. **Implementation** — a person (or decision-making unit) puts an innovation into use.
5. **Confirmation** — a person (or decision-making unit) evaluates the results of an innovation-decision already made (Rogers, 1995).



Source: Rogers, 1995, page 170.

Figure 2. Model of Stages in the Innovation-Decision Process.

There are some key features of the model. At the knowledge stage, characteristics of earlier knowers are different from late knowers. Some characteristics of the earlier knowers are that they are better educated, and have higher social status and wider social networks. In other words, there are three characteristics of the decision making unit: socio-economic characteristics, personality variables, and communication behavior. At the persuasion stage, people become more psychologically involved with the innovation, and develop a general perception of the new idea. Such perceived attributes of an innovation as its relative advantage, compatibility, complexity, trialability, and observability are important at this stage. Relative advantage is the degree to which an innovation is perceived as being better than the idea it supersedes. The degree of relative advantage is often expressed as economic profitability. Compatibility is the degree to which a new idea is perceived as consistent with the existing value, past experiences, and needs of potential adopters. An idea that is more compatible is less uncertain to the potential adopter and fits more closely with the individual's situation. Complexity is the degree to which a new idea is perceived as relatively difficult to understand and use. Trialabilityis the degree to which a new idea may be experimented with on a limited basis. Innovations that can be tried on the installment plan are generally adopted more rapidly than ones that are not divisible. Observability is the degree to which the results of a new idea are visible to others.

Once a person makes a decision whether to adopt an innovation (adoption or rejection), there are four alternatives sequentially (continued adoption, later adoption, discontinuance, and continued rejection). Discontinuance is a decision to reject an innovation after having previously adopted it. There are two types of discontinuance: (1)

replacement discontinuance, in which an innovation is rejected in order to adopt a better idea which supersedes it, and (2) disenchantment discontinuance, in which an innovation is rejected as a result of dissatisfaction with its performance (Rogers, 1995).

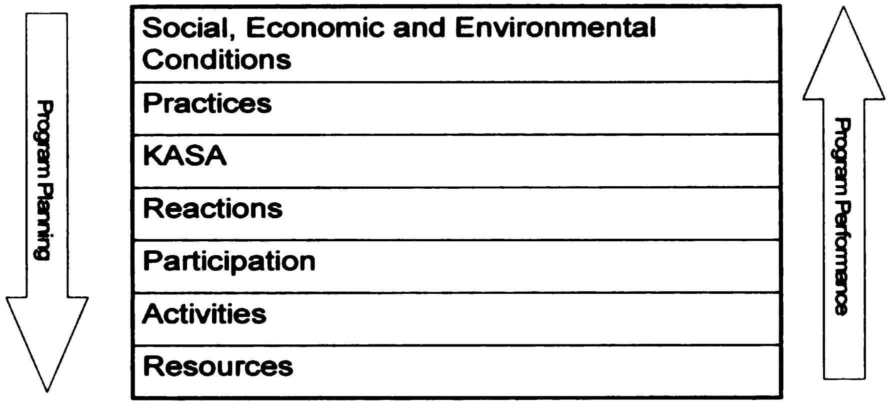
Evaluating Impacts of Extension Programs

Evaluating the impacts of extension programs is important in order to improve them.

Farmers may obtain enough knowledge through communication and education procedures to decide whether or not they will adopt the technology. If the farmers decide to adopt the technology, then it will be implemented.

Under the rubric of Agricultural Development, many agricultural programs aimed at improving productivity in developing countries have been planned and implemented with the support of international organizations and foundations, and extension has played an important role in these programs. Recently, the need for accountability to stakeholders of the programs has been increased; as a result, program evaluation has also increased in importance in agricultural extension.

According to Suvedi and Morford (2003), "evaluation is a management tool that involves measuring and reporting on the results of programs". In the theory of evaluation, there is a model to help extension workers focus on outcomes through program planning and evaluation, the Targeting Outcomes of Programs (TOP) model (Bennett and Rockwell, 1994). TOP assumes that most extension programs are represented by the model in Figure 3.



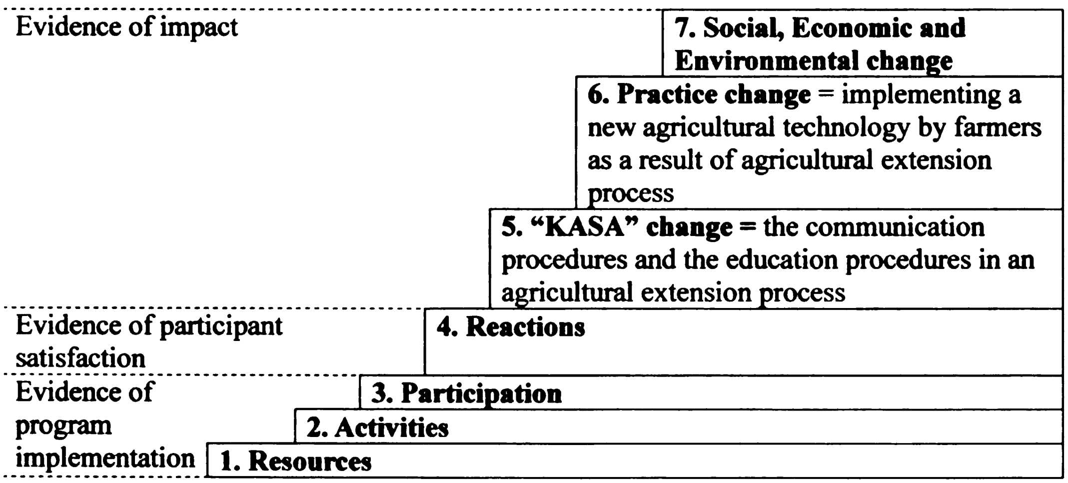
Adopted from Bennet and Rockwell, 1994.

Figure 3. Hierarchy in Extension Program.

Program planning descends the model on the right side and program performance ascends the model on the left side. Resources refer to the staff time devoted to the program and the money spent on it. Activities is a list of the methods and techniques used to transfer information to a target audience. Participation includes description of the participants. Reactions focus on how participants feel about the program. KASA, Practices, and Social, Economic and Environmental Conditions are the short-term, medium-term and long-term impacts of the program, respectively. Finally, impacts are the lasting and generalized changes achieved by a program.

For extension workers, understanding the impacts is important to improve the program. Figure 4 shows the hierarchy for targeting program impacts. The three levels of impacts are all outcomes of the program, and they are interrelated. Practice change refers to individuals or communities altering behaviors in a manner that produces positive or negative changes in social, economic and environmental conditions. KASA change, such as increased knowledge, attitude or opinion shift, skills improvement, and aspirations to change courses of action, will happen before practice changes occur. In other words, KASA change results in practice change, and practice change results in economic, social and environmental change due to program performance (Rockwell, 1996).

In the extension process, the communication procedures and the education procedures refer to the KASA change in the TOP model, and Practice change refers to farmers implementing a new technology. In addition, Kim and Hunter (1993) indicated that the larger the attitudinal relevance, the stronger the relationship between attitude and behavior. Therefore, among the KASA changes, understanding farmers' attitude shift in order to predict the degree of adoption rate of the technology is important for evaluating agricultural extension programs.



Source: Rockwell, 1996.

Figure 4. Hierarchy for Targeting Impacts of Programs.

Vegetable Production and Marketing in Indonesia

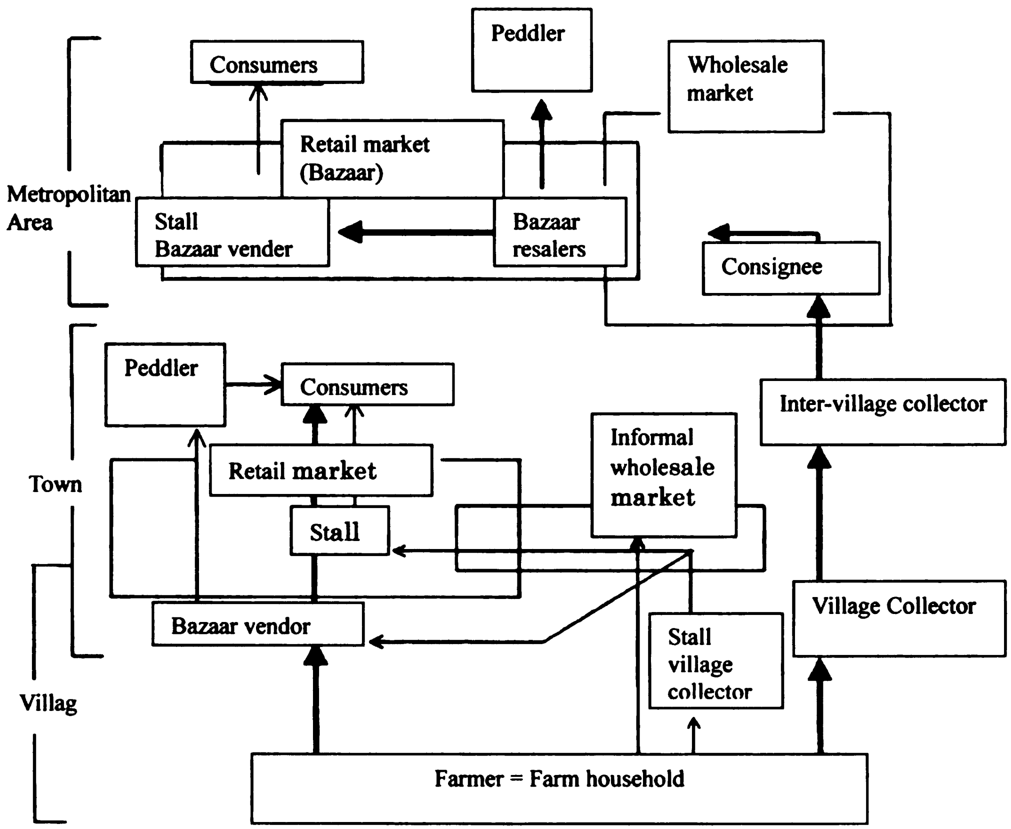
In Indonesia, vegetables are classified as either highland or lowland types. Lowland (tropical) vegetables are generally grown below 1,000 meters and most intensively in coastal areas. Due to the market demand, tropical vegetable cultivation takes place in households somewhat near the production sites. Highland (temperate) vegetables are primarily grown in mountain areas that characterize central areas of the archipelago, and consumption often occurs far from the farmers who grow them because of the largely intensive production. Table 1 shows the most important vegetables by wholesale value in 1999. According to crop value, the most important were: chili, shallot, potato, and cabbage (Mather, et al., 2002). According to Agung (2001), and Sudana and Temaja (2002), many companies in the agricultural sector and educated farmers are showing a greater interest in organic vegetable production (Sudana, et al., 2003).

Table 1. Vegetable Harvested Area, Production, and Value of Production in Indonesia in 1999.

Vegetables	Planted Area (ha)	Production (mt)	Price (Rp/kg)	Wholesale Value Million Rp	Rank
Chili	183,347	1,007,726	8,043	8,105,140.2	1
Shallot	102,289	938,293	5,154	4,835,962.1	2
Potato	62,776	924,058	3,161	2,920,947.3	3
Cabbage	65,352	1,447,910	1,119	1,620,211.3	4
Tomato	46,259	562,406	956	537,660.1	5
French Bean	28,546	282,198	1,828	515,857.9	6
Leek	36,882	323,855	1,521	492,583.5	7
Carrot	17,985	286,536	1,217	348,714.3	8
Cucumber	48,121	431,950	741	320,075.0	9
Garlic	12,936	62,222	3,943	245,341.3	10

Source: Mather, et al., 2002.

There are no marketing control systems for vegetables in Indonesia. Under these free distribution systems, primary factors in forming a marketing channel are conditions of supply and demand, characteristics of commodities, and distributional technologies and infrastructure. Basically, mainstream vegetable marketing was local because vegetables are perishable goods; however, marketing areas have been expanding due to increasing population and progressing storage/transport technologies. Therefore, it is difficult to generalize Indonesian vegetable marketing channels (Nourin Tokei Kyokai, 1995).



Source: Hayami and Kawagoe, 2000; Darmawan and Pasandaran, 2000.

Figure 5. Marketing Channels for Vegetables in West Java.

Figure 5 is a vegetable marketing channel in West Java. There are two significant features: the clear separation of the channel for local consumption from the channel for shipment to other regions, and the specialization of the inter-village collectors and market retailers. Vegetables for metropolitan markets are gathered by village-collectors (pengepak), and then shipped via inter-village collectors; normally no vegetables are used for local consumption. For local markets, the most important agent is the 'bazaar vendor' (pedagang kaki lima). Bazaar vendors are usually village women who collect vegetables in quantities of about 100-200 kg from nearby farmers and transport them by minibus to the bazaar for sale. Their customers are housewives, as well as peddlers and keepers of small grocery stores (warung) in town (Hayami and Kawagoe, 2000; Darmawan and Pasandaran, 2000).

Recently, the number of supermarkets has increased rapidly, and contract farming systems between supermarkets and farmers' groups have been observed in the marketing channel (Reardon, 2004; Witono, et al., 2005). Organic vegetables are sold under contract in some supermarkets and hotels in the big cities of Indonesia (Dadang, et al., 2006).

Development of New Bio-Agents for Alternative Farming (DNBAF) Project

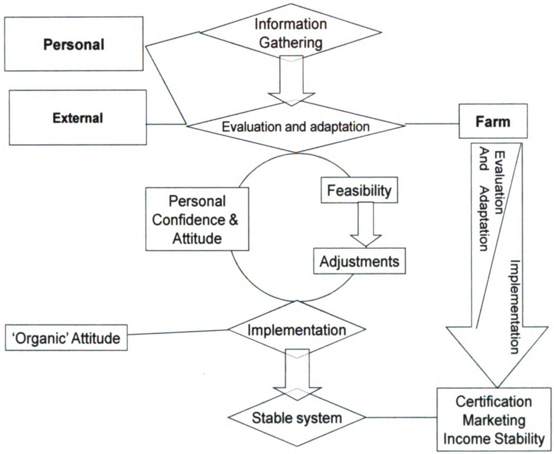
The DNBAF project was initiated by TUA in collaboration with universities in four other countries in 1999: Bogor Agricultural University and Udayana University in Indonesia, Hanoi Agricultural University in Vietnam, Kasetsart University in Thailand, and National Agrarian University La Molina in Peru. The general purpose of the project is to develop bio-pesticides and establish sustainable farming systems, based on the exploration and use of new bio-agents rather than agro-chemicals. The project is being implemented in two phases: phase I (1999-2003) and phase II (2004-2008), and is organized into four teams. The first team is the "Bio-pesticide Team," whose objective is to find bio-active substances produced by plants, and apply them as bio-pesticides. The second team is the "Microorganism Team," with the objective to find parasitic microorganisms that control insect pests and weeds, and develop their bio-functions. The third team is the "Natural Enemies Team," whose objectives are to establish natural enemies technology by investigating interactions among insects specific to local conditions, and discover new control methods by applying bio-technology. The fourth team is the "Farming System Team," whose objective is to develop alternative farming systems, based on crop production technology with bio-agents (Academic Frontier Research Center, 2005).

It is anticipated that the organic farming technologies developed by the DNBAF project will be disseminated to farmers after enough data have been accumulated (A. Fujimoto, personal communication, October 2, 2006). Two of the demonstration farms are located in Sukagalih village in West Java, and in Bangli village in Bali. The pilot farms started production in January of 2005, testing two types of organic vegetable practices: application of bio-pesticides and use of compost. The DNBAF project held workshops to teach the two organic methods to the farmers in July of 2007 in West Java and in September of 2007 in Bali.

Model of the Process of Organic Conversion

Susanne Padel (2001b) studied the organic conversion process of milk production in the United Kingdom. In this study, Padel (2001b) clarified that the organic conversion process is a typical example of the diffusion of an innovation by a literature review of studies of Western organic farmers. Padel (2001b) also developed the model of the organic conversion process based on Roger's adoption/diffusion model (Rogers, 1995).

Figure 6 shows Padel's model of the organic conversion process. The model consists of three key stages and factors that influence the decision to convert to organic farming (Padel, 2001b).



Source: Padel, 2001b, page 176.

Figure 6. Padel's Model of the Organic Conversion Process.

Padel (2001b) developed the basic structure of the three stages in the farmers' decision-making process based on the adoption model (Rogers and Shoemaker, 1971; Rogers, 1995), and modified the model for organic farmers and conversion.

The three key stages are: 1) information gathering, 2) evaluation and adaptation and 3) implementation. The information gathering stage reflects the farmers' general need for information and has no impact on the farm. During the evaluation and adaptation stage, the farmer learns more intensely about the new practices through a combination of a theoretical as well as a practical evaluation, leading to the adaptation of new practices and growing confidence to continue. The final implementation stage appears necessary during conversion because a farmer has to reduce the reliance on external inputs and increase the management of biological and ecological processes (Padel, 2001b).

Padel (2001b) also identified the factors as variables influencing the decision to convert to organic farming at each stage through the literature review. The factors are summarized using three categories (Personal, Farm and External factors) based on Willok's categorical work (1994) in Table 2.

Table 2. Factors Influencing the Decision to Convert to Organic Farming.

Personal	***Farm***	***External***
Personal characteristic	**Farm resources**	**Relative profitability**
Background	Farm size	Conversion aid programs
Age	Farm type	Organic market stores
Social network	Enterprise structure	Organic premiums
Gender	Capital resources	Input & output prices
Goals, objectives, values	Labor resources	Subsidies
Lifestyle and health		**Institutional factors**
Organic farming knowledge		Availability of information
Technical		Farming press
Profitability		Research
Market development		Advisory support
Personal attitudes		Loans
To the environment		
To input & technology		
To business		
To challenge and change		

Source: Padel, 2001b.

Therefore, the organic conversion process represents basically three key stages that are influenced by personal, farm specific and external variables. The three key stages and their relationship to variables are discussed as follows:

Information Gathering Stage

Personal variables influence the Information Gathering stage. Organic farmers and potential organic farmers tend to have broader environmental concerns, and they appeared to have a positive attitude to challenge and change (Duram, 1999). A lack of technical, financial and marketing information remains an important barrier for organic conversion and could influence farmers' attitude in taking further action (Fairweather, 1999; Midmore et al., 2001; National Westminster Bank, 1992; Soil Association, 2000).

External variables do not directly affect farmers' decision-making, but they do influence their perception and attitude toward organic conversion. For example, organic premium prices, changes in conventional agricultural prices, food and farming scares, and subsidies for conversion and organic management have the additional affect of enhancing the profile of organic farming (Michelsen et al., 2001; Padel et al, 1999). This personal opinion about external variables is formed on the availability of information to farmers, which influences attitude. In addition, farmers' health experiences influence their attitude (Padel, 2001b).

Evaluation and Adaptation Stage

Personal, farm, and external variables influence the Evaluation and Adaptation stage. This is the key stage in the farmers' conversion process, and this stage represents an important time of knowledge-building and development of insights for farmers (Padel, 2001b).

There are four ways to evaluate organic farming (Padel, 2001b):

1. gradual adoption or extensification (e.g., clover production before conversion),
2. block experiments (e.g., organic farming on a block of land),
3. gradual implementation (e.g. staged conversion), and/or
4. theoretical evaluation (e.g., financial feasibility assessment and conversion planning).

Farmers did practical evaluation of organic farming in one of the three different ways in her study. Therefore, practical experience with a new system is essential to make firm decisions in progressing to the Implementation stage for farmers (Rogers and Shoemaker, 1971; Padel, 2001b). Also, farmers adapt the new organic systems to suit their personal objectives and farm resources (Padel, 2001b). The period of this stage vary from one to approximately ten years. External variables such as conversion aid may force farmers into having certain period of the Evaluation and Adaptation stage (Padel, 2001b).

The distinction between the Evaluation and Adaptation stage and the Implementation stage depends on the farmer's confidence and attitude toward being able to manage organic farming. This indicates that attitudes influence not only the propensity to conversion, but are also important for further progression (Padel, 2001b). Willock et al. (1999) pointed out that the experience of practical experiments and gradual implementation influence the farmer's attitudes. Thus, the attitudinal difference found between organic and non-organic farmers (Beharrell and Crockett, 1992; McCann et al., 1997; De Cock, 2005) reflect the outcome of this attitudinal change process that farmers experience when they evaluate and implement organic farming, as well as attitudinal differences in their propensity to consider organic conversion in the first place (Padel, 2001b).

Implementation Stage

Personal and farm variables influence the Implementation stage. It is difficult to differentiate exactly between the Evaluation and Adaptation stage and the Implementation stage because farmers begin to practice organic farming gradually. However, if a farmer has certification as an organic farmer, he has moved to the Implementation stage (Padel, 2001b). The implementation time period varies because there are numerous ways to establish an organic system. In some cases farmers may undergo additional declines in yields and income before they qualify for premium organic prices (Dabbert, 1994; Padel and Lampkin, 1994).

Conventional and Organic Vegetable Production Context in Indonesia

Compared with the Western world, Indonesia's organic movement is fairly new, which means that there may not be many organic farmers to construct a model at the implementation stage of Roger's and Padel's models. Therefore, to develop an Indonesian model of organic conversion, Indonesian organic agricultural studies were reviewed and discussed, focusing on the influencing factors at the Information gathering and the Evaluation and Adaptation stages in the Padel's model.

Policies

Indonesia began to implement IPM policies after reliance on pesticides failed to control pests. In 1989, the first national IPM program was established as a follow-up of Presidential Decree No.3/1986. The program had a broad range of community-based activities such as IPM training for farmers, and helped spread IPM knowledge and skills. As a result, the Indonesian IPM Farmer Association was organized by 461 farmer representatives from 11 project-provinces in 1999. After the Asian Financial Crisis in

1997, the national government, short of funds, shifted the responsibility for IPM programs to local agencies (Alimoeso, et al., 2001; Arya, et al., 2001).

The organic agricultural movement in Indonesia has occurred as a part of the world organic development that opposes ecological destruction and social degradation. In 2000, the Ministry of Agriculture made a policy about organic agriculture, which was called "Go Organic 2010." Under the policy, the Board of Indonesia Organic Certification (BIOCert) was established as an organic certification agency by 33 Indonesian organic NGOs, researchers, the private sector and farmer groups in 2002. The BIOCert's goals include protection for small farmers, while promoting environmental and agricultural sustainability. BIOCert gives recognition to indigenous knowledge, and places importance on social justice (BIOCert, 2004).

Research Activities in Vegetable Production

There have been some research projects to assess and resolve the sustainable agricultural problems of vegetable production systems in Indonesia, such as the DNBAF project, which study production efficiency and ecosystem conservation in highland Indonesia, conducted by researchers of TUA, Osaka Prefectural University and Okayama University in Japan, in collaboration with Bogor Agricultural University and Udayana University in Indonesia (Fujimoto and Abdullah, 2001). Another project, attempting to evaluate and improve regional farming systems in Indonesia, is being conducted by the Japan International Research Center for Agricultural Science (JIRCAS) and the Ministry of Agriculture of Indonesia (JIRCAS, 2005). Through these projects, useful alternative agricultural production techniques were developed and recommendations have been made (Academic Frontier Research Center, 2005 and 2006; JIRCAS, 2005; Fujimoto and

Abdullah, 2001; ISSAAS, 2003 and 2005). However, the extent to which these technologies have been adopted by farmers has not been fully studied and evaluated.

Technical Feasibility for Organic Vegetable Production

The DNBAF project published several papers concerning the technical feasibility of organic vegetable production in West Java and Bali. Among them, I focused on the papers dealing with the technical feasibility at the field level.

Dadang, et al. (2005) conducted field tests to evaluate the effectiveness of plant extracts (extract mixtures of *Swietenia mahogany* and *Aglaia odorata,* both belonging to Meliaceae) on cabbage insect pests in Cianjur, West Java. According to the study, the application of the plant extracts at 0.2 and 0.4 percent reduced the larval population of *Plutella xylostella* (L.) (Lepidoptera:Yponomeutidae), which is a major insect pest on cabbage. In addition, plant extracts were as effective as application of synthetic insecticides (profenofos and deltamethrin).

Sumiartha, et al. (2005) conducted a field experiment to evaluate the effect of Selasih plant, or sweet basil (*Ocimum. tenuiflorumoil*), as an attractant to fruit fly (*Bactrocera dorsalis* complex) populations on long chili fields in Mengwi, Bali. Petrogenol (commercial methyl eugenol) and Selasih oil were equally effective. The use of Selasih oil can be an effective bio-agent to control fruit fly populations.

Sudana, et al (2003) conducted a one-year monitoring survey on organic and conventional vegetable production in Bali in 2001. Organic farmers used organic fertilizers only, including cow dung, chicken manure, and compost. For plant pest and disease management, they used mainly microorganisms and botanical pesticides. Recently some commercial bio-pesticides, such as Turex, Bipel and Bactospine, with the active ingredient *Bacillus thuringiensis*, became available. In addition, the farmers often use EM 5 (fermented botanical bio-pesticide: Sudana, et al., 2005) to control plant pests and disease.

Economic Feasibility for Organic Vegetable Production

Dadang, et al., (2006) conducted vegetable farming experiments in Megamendung, West Java, for approximately a year. The commodities were tomato and cabbage and the experiments tested six treatments: organic farming of cabbage, organic farming of cabbage and tomato, low-input farming of cabbage, low-input farming of cabbage and tomato, conventional farming of cabbage, and conventional farming of cabbage and tomato. The study showed that conventional farming was superior to organic and low-input farming in terms of yield. According to the economic analysis, non-organic farming was more profitable than organic farming, even though prices of organic vegetables were higher than the conventional vegetables in the study area (Dadang, et al., 2006).

Sudana, et al., (2003) conducted a one-year monitoring survey on highland vegetable cultivation with 10 plots in Candikuning village, Bali. There were two company-based organic farmers, four family-based organic farmers, and five conventional farmers. Mainly, cabbage, cauliflower, leek, carrot and potato were grown in the study area. The company-based and family-based farmers sold their vegetables through a contract system with supermarkets, hotels, and restaurants. The conventional farmers had three marketing channels: local wholesaler, wholesaler at the local market, and government cooperative. Organic vegetables commanded higher prices than did non-organic vegetables. However, the prices of company-based produce were higher than the family-based produce because the quality of the latter was lower. Economic analysis of this study revealed the highest net revenue was obtained by the company-based farmers, typically earning 14 million Rupiah (Rp.) per 0.1 hectare per year. The second highest net revenue was by the family-based farmers with about 700,000 Rp and the lowest net revenue was earned by conventional farmers with about 600,000 Rp. However, the conventional farmers who grew vegetables received higher net revenue than the family-based farmers. (Sudana, et al., 2003). The reason why the farmers received higher revenue was high profitability of potato production (Miyaura, et al., 1998).

Syaukat's (2006) study was conducted in Sukagalih village, West Java. He carried out a survey of 35 vegetable farmers: seven organic farmers and 28 conventional farmers. Economic analysis showed that organic crop yield was less than conventional crops. However, net revenue of organic farmers (Rp. 20.7 million per hectare per year) was higher than those of conventional farmers (Rp.15.7 million). Also, the organic farmers had higher total costs than the conventional farmers. Intensive labor use and the use of organic fertilizer (bokashi) in the organic farming system accounted for t significant cost difference between organic farmers and conventional farmers.. There was no problem in marketing the organic vegetables, and the study concluded that organic vegetable farming was technically and economically feasible in the study area (Syaukat, 2006).

Principally, farmers' acceptance of organic agriculture systems depends on profitability (Syaukat, 2003), and rational farmers consider only the profits rather than quality of the environment (Dadang, et al., 2006). Even though the study of Dadang, et al. (2006) found organic farming was less profitable and productive than non-organic farming, results from two farmers' survey showed that an organic farming system is economically feasible in highland vegetable production. One of the possible reasons of the results seen in the Dadang, et al (2006) study could have been that the experimented period was not long enough to develop organic farming systems. In many developed counties, to obtain organic certifications, farmers need to have a certain period of transition (several years) from conventional to organic farming systems (Padel, 2001b).

Other Factors Influencing Farmers' Decisions to Convert

Syaukat's (2006) described characteristics of organic farmers in his study. There were seven organic farmers and two of them were pioneers. The pioneers were outsiders who brought knowledge and capital to their village in order to run organic vegetable farming. Later on, a few local farmers followed their lead and adopted organic farming. He also mentioned even if there were no market problems, farmers should expand their potential organic market.

Sudana, et al. (2003) suggested that support in the form of low interest loans and subsidies from the government or private sector would be very useful for promoting organic farming systems for small-scale farmers. In addition, the establishment of a certification system for organic farming is urgently needed to guarantee consumers' trust in the quality of production. This system could also support premium prices for organic produce.

Syaukat (2003) conducted a survey of 21 farmers in the categories of conventional farmers and low-input farmers, and analyzed the factors affecting farmers' adoption of low-input rice farming in Karawang, West Java. He used a linear probability model, probit model, and logit model for the analysis, and identified such factors as the farmers' age, field-courses taken in IPM, land status, years of education, land area, fertilizer costs, pesticide costs, labor costs and net income. The results showed that the most statistically significant factors in affecting farmers' decision to adopt low-input rice farming were total costs of labor, IPM courses, and land area. Moreover, farmers considered the total cost of labor as the factor in selecting the farming system.

Conceptual Framework of Organic Conversion in Vegetable Production in Indonesia

Possible Factors Influencing the Decision to Convert to Organic Farming

To identify possible factors influencing the decision to convert to organic vegetable production in Indonesia, the factors were summarized based on Padel's work (Table 2) in Table 3 with corresponding references. There were some variables in Padel's original factors that were not confirmed by literature review. These variables were *social network, gender, objectives and values, lifestyle and health*, and *personal attitude* in personal factors, and, *availability of information* and *farming press* in external factors.

Table 3. Possible Factors Influencing the Decision to Convert to Organic Vegetable Farming in Indonesia.

Personal	***Farm***	***External***
Personal characteristic	**Farm resources**	**Relative profitability**
Education level, Farming experience, Household size (Syaukat, 2006)	Farm size (Syaukat, 2003)	Agricultural policy (Sudana, 2003)
Age (Syaukat, 2003)	Land tenure status (Sudana, 2003; Syaukat, 2003)	Marketing service (Syaukat, 2006)
Information sources*	Availability of loans (Syaukat, 2003; Sudana, 2003)	Net revenue of the target vegetable productions per hectare (Dadang, 2006; Sudana, 2003; Syaukat, 2003, 2006)
Gender*	Availability of labor (Syaukat, 2003)	**Institutional factors**
Location*		Extension systems (Sudana, 2003)
Organic farming knowledge		
Attitude toward the target organic methods*—technical, profitability, and market development (Dadang, 2005; Sumiartha, 2005; Sudana, 2003; Dadang, 2006; Syaukat, 2006)		

Note: This table is based on Padel's work (Table 1). *Variables have not been discussed in the literature in Padel's original factors.

Social Network, Availability of Information and Farming Press Variables

In general, the more social contact people have, the more information was available. Thus, *social network* in personal factors and *availability of information* in external factors were related to each other. According to Rogers (1995), the availability of information about the innovation was considered as an important pre-condition for its wider diffusion in the theory. In other words, these variables could be considered as *information sources*. In this study, the model farm could be a different information source from others such as radios, TVs, books, and other farmers. This is called the *exposure to model farm* variable.

Gender and Lifestyle and Health Variables

There was some indication that a woman's influence was significantly important for the development of organic farming (Padel, 2001a). According to R. Fischer (1982), a qualitative study done in Switzerland on the motivation to adopt organic farming, several of the 100 organic farmers said that initial 'organic' ideas came from women (as cited in Padel, 2001a). Also, R. Fischer (1982) and P. Fischer (1989) pointed out that organic methods were tried and initially adopted for small vegetable gardens, which were traditionally the woman's domain in developed countries (as cited in Padel, 2001a). In addition, women's roles as caretakers of family nutrition and health led to women being the ones to purchase and use organic products, as these products were perceived as better foods for family health (Padel, 2001a). Historically, the development of the organic agricultural movement occurred from bottom up in developed countries, whereas it has been occurring from the top down in developing countries (A. Fujimoto, personal communication, June 4, 2007). Therefore, even if *gender* and *lifestyle and health* variables were significant in the organic conversion process, such variables may lack significance in Indonesia because of the top-down approach to developing organic farming. In this study, I only focused on the *gender variable* because it was very difficult to measure the *lifestyle and health* variables in quantitative terms.

Goals, Objectives and Values Variables

Goals, objectives and values variables would be related to farmers' value systems. However, it was very difficult to identify value systems. One significant factor in their value systems could be religion. In Padel's model (2001b), the *goals, objectives and values* variables might be influenced by Christianity, because Padel developed the model based on reviewing many organic conversion studies in Western countries which were predominately Christian. On the other hand, about 90 percent of Indonesians are Muslims, and the inhabitants in Bali are predominately Hindu. There could be differences in value systems among religions. Thus, the *location* variable as religion variable was proposed as a possible variable influencing the decision to convert to organic farming in Indonesia instead of *goals, objectives and values* variables.

Personal Attitude Variables

Kim and Hunter (1993) mentioned that the larger the attitudinal relevance, the stronger the relationship between attitude and behavior. Thus, *attitude toward the target organic methods* variables was expected to be a significant factor.

Other Variables

Since one of the research objectives was to determine farmers' awareness of model farm and the organic vegetable production practices, *exposure to the model farm*, *distance to the model farm* and *awareness of the target organic methods* variables could be important factor. Moreover, an irrigation resource was very important for vegetable production in developing countries (M. Suvedi, personal communication, May 3, 2007) so that the *irrigation resources* variable was expected to influence farmers' decisions of organic conversion.

Conceptual Framework for the Process of Organic Conversion in Vegetable Production in Indonesia

Figure 7 showed a proposed Indonesian model for the process of organic conversion in vegetable production. The model was developed by Rogers (1995), and possible influencing variables were identified by Padel's study (2001b) reviewing

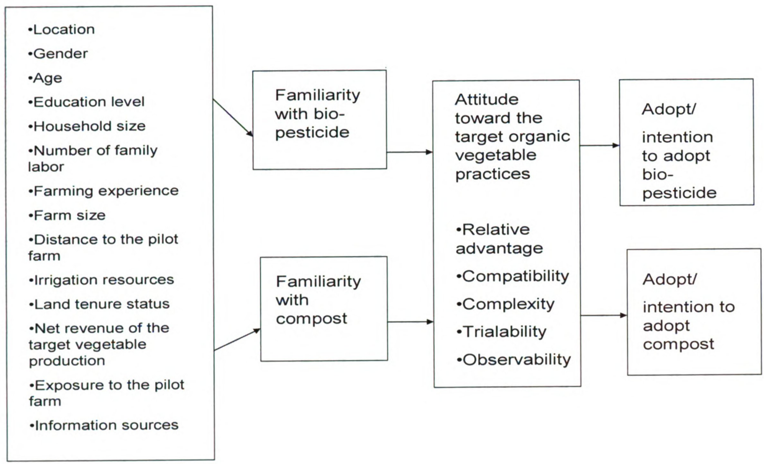


Figure 7. Conceptual Framework for the Process of Organic Conversion in Vegetable Production in Indonesia.

Indonesian organic farming. In this study, target vegetables were cabbage, tomato, and chili because these were the most widely planted crops in the study sites of West Java and Bali. Selected target organic farming methods were the application of biological insecticides and use of organic fertilizers only. In the model, agricultural policy, extension systems and marketing conditions were considered to influence indirectly the organic conversion process.

Study Hypotheses

The following hypotheses have been drawn to be tested by the model:

(1) socio-economic variables will affect the familiarity with bio-pesticides and compost. The socio-economic variables are: respondent's location, gender, age, education level, household size, number of family laborers, farming experience, farm size, distance to the pilot farm, irrigation sources, land tenure status, net revenue of cabbage, tomato, carrot production; exposure to the pilot farm and any information source groups (media, extension, farmer and commercial group); and, (2) farmers' familiarity with the target organic vegetable practices will affect farmers' attitude toward the target organic methods, and make it possible to increase the chance that the farmer will adopt organic farming by changing their attitudes toward the target organic methods.

Summary

This chapter provided the history of agricultural development, and role of agricultural extension in developing countries. This chapter also reviewed the literature and research on evaluating impacts of extension programs, diffusion of innovation in organic conversion, and the related literature on the engaged organic vegetable production in Indonesia. Additionally, a conceptual framework was developed based on the diffusion of innovation theory and the study of Padel. The methodology for the study will be discussed in chapter III.

Chapter III

METHODOLOGY

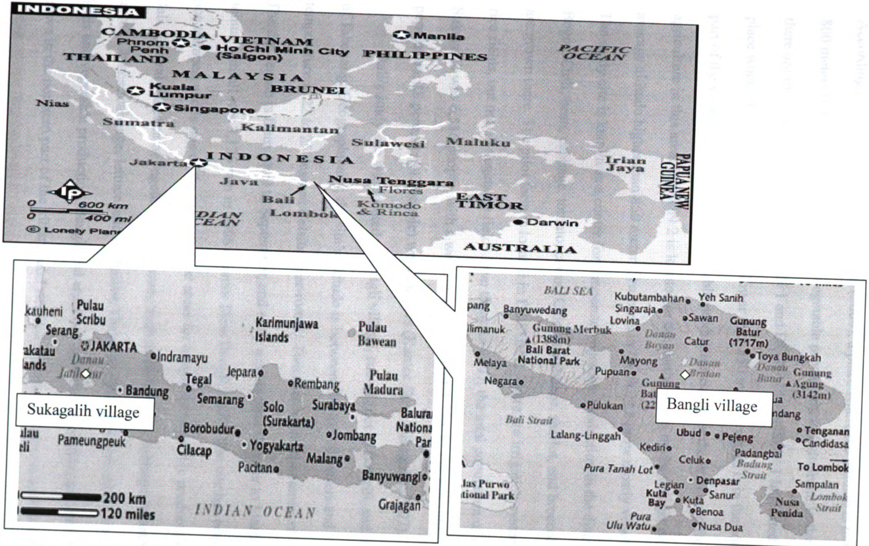
Research Design

This study is considered descriptive research, as described by Leedy (1993), with a mixed methods design. The mixed methods research design "includes the use of both quantitative and qualitative methods for data collection and data analysis" (National Science Foundation, 2002). Though it is relatively new in social and human sciences as a distinct research approach (Creswell, 2003), mixed methodology has been utilized successfully in many international agricultural evaluation studies (Tmanov, 2001). The method could provide an excellent understanding of the overall picture of a study, and bring distinct insight to the study (Tmanov, 2001). According to Tashkkori and Teddlie (1998), most studies using a mixed method generate numerical and narrative data.

Research Area

The research was conducted in two communities of Indonesia: Sukagali village in West Java and Bangli village in Bali. Figure 8 shows a map of Indonesia and the research sites.

West Java's study site was located at Sukagalih village, sub-district of Megamendung, and district of Bogor. At an altitude from 450 to 1,000 meters and with a year-round temperature of 21to 25 degrees Celsius, there are two seasons in terms of rainfall – the dry season from May to September, and the rainy season from October to April. The average annual rainfall was 2,145 mm in recent years (Kantor Desa Sukagalih, 2007; Rudi, 2005). Most of the land is terraced because of the hilly terrain.



Source: University of Texas Libraries

Figure 8. Map of Indonesia and the Research Sites

According to Darmawan and Pasandoran (2000), a place where the altitude is more than 800 meters is appropriate for temperate vegetable production in Indonesia. In the village, there are two sub-districts called DUSUN 1 and DUSUN 2. DUSUN 1 is located in a place where the predominant altitude is lower than 850 meters, which is in the southern part of the village. Rice and some vegetable production occur on the land used for agriculture in this area. DUSUN 2 is located in the northern part of the village, with an average altitude higher than 850 meters. Farmers in DUSUN 2 grow mostly vegetables. The study site is known as a center for temperate vegetable production in the district of Bogor. Chili, bean, cabbage, tomato, carrot, Chinese cabbage, shallot, and broccoli crops are grown there. The pilot farm is located in DUSUN 2. There are irrigation systems for rice fields, but not all vegetable fields have them. In 2007, the total population of Sukagalih was 6,516 people, with a working population of 2,296. In the working population, 28 percent (643 people) were farmers (Kantor Desa Sukagalih, 2007).

Bali's study site was located at Bangli village, sub-district of Baturiti, and district of Tabanang. Geographically, the site's altitude is between 700 to 900 meters and temperature is 22 to 25 degrees Celsius year-round. Two seasons exist in terms of rainfall. The dry season is from April to September, and rainy season from October to March. The annual rainfall was 3,126 mm in 2006 (Kantor Desa Bangli, 2007). The site has beautiful rice terraces, and is one of the most popular areas for temperate vegetable production in Bali. Several varieties of vegetables are grown, such as chili, beans, cabbage, tomato, carrot, Chinese cabbage, lettuce, and cucumber. There are irrigation systems for rice fields and vegetable production. Bangli had eight sub-districts. Vegetables and coffee are grown in the northern part of the village, and rice and some vegetables are grown in the southern part. The pilot farm exists in a sub-district of the northern part of the village. The population was 4,394 people, with 1,667 people making up the working population. Thirty percent of the working population (500 people) consisted of farmers in Bangli (Kantor Desa Bangli, 2007).

Units of Analysis

There were two major units of analysis used in the study. The first was a group of vegetable farmers living around the pilot farms. The second was a group of agricultural professionals representing agricultural policy makers and extension workers, and those involved in organic vegetable market systems.

Data Collection Procedures

The data collection process consisted of two parts. The first part was a face-to-face survey of vegetable farmers to assess their awareness of, attitudes toward and intent to adopt the target organic vegetable production practices. The second part (the interviews with key informants) was conducted with agricultural professionals in three different fields of agriculture to obtain current information about vegetable production policy, the agricultural extension system, and current issues in organic vegetable marketing. These methods are described below:

Face-to-face survey

Population and Sample

Rural households producing vegetables in the DUSUN 2 of Sukagalih (N = 312) in West Java and the three sub-districts called MUNDUR ANDONG, TITIGALAR, and BANGLI (N = 315) of Bangli in Bali represented the population in this study. The population of the study was comprised of vegetable farmers who lived around the pilot farms in the study sites of Sukagalih village, West Java and Bangli village, Bali. The population list was developed by the researcher through interviews with each head of villages' sub-districts to obtain information about the households in each. A systematic sample with a random start was used for sample selection. Data were collected between July and August in Sukagalih, and September to October in Bangli. The survey was conducted between July 24th and August 24th of 2007 in West Java, and between September 23rd and October 19th of 2007 in Bali. In this study, every third name was chosen from the lists. Table 4 shows sample sizes of the two study sites.

Table 4. Third Name Sampling of Households in West Java and Bali

Villages	Sub-districts	HH Population	HH interviewed
Sukagalih (West Java)	DUSUN 2	312	107
Bangli (Bali)	**MUNDUR ANDONG**	179	56
	TITIGALAR	88	31
	BANGLI	48	16
	Total	315	103

Instrument Development

The face-to-face survey questionnaire was developed by the researcher, based on the review of pertinent literature and methodology. The instrument followed recommendations described by Francis, et al. (2004) in *Constructing questionnaires based on the theory of planned behaviour: A manual for health service researchers*, and by Alreck and Settle (1995) in *Survey Research Handbook.*

Content

The instrument included a definition of terms and eight major sections: basic information of respondents' vegetable production and knowledge of organic farming, vegetable production and marketing, exposure of the DNBAF project pilot farms, information source, awareness of organic vegetable production practices, attitude toward the organic farming methods, intention of conversion to organic, and background information. Table 5 shows the detail of the instrument.

Table 5. Structure of the Survey Instrument.

Section	Information collected	Number of items
Introduction	Basic information of respondents' vegetable production and knowledge of organic farming	6
1	Vegetable production and marketing;	
	Cabbage	26
	Tomato	26
	Carrot	26
2	Exposure of the DNBAF project pilot farms	5
3	Information source	1
4	Awareness of the organic vegetable production practices	8
5	Attitude toward the organic vegetable production practices	2
6	Intention to adopt the organic vegetable production practices	2
7	Background information	7
Total		109

The introduction section included basic information about respondents' vegetable production and knowledge of organic farming. The items in this section addressed farmers' total farming and vegetable farming areas, varieties of vegetables grown in the last growing season between 2006 and 2007, whether or not a respondent knew the term "organic farming" and its meaning, and land use of respondents' farming lands.

Section 1 included items about vegetable production and marketing of cabbage, tomato and carrot. Farmers who had grown at least one of the three vegetables within the last growing season between 2006 and 2007 were asked questions in this section. Moreover, in order to calculate net revenues from vegetable production per unit area, the following items were covered: vegetable yield, price per kilogram, marketing method, availability of loans, varieties of seedlings, fertilizers, pesticides and their costs, and other vegetable production costs including labor cost, selling cost and other material cost.

Section 2 included items about exposure to the DNBAF project pilot farms. In this section, farmers were asked if they had either heard about, seen, visited, or worked at the pilot farms or talked with the project people.

Section 3 included items about information sources. Here farmers were asked where they obtained information for their vegetable production in the past year. This was a multiple choice question.

Section 4 included items about farmers' awareness of (familiarity with) the target organic vegetable production practices. In this section, farmers were asked eight different statements on their degree of familiarity with bio-pesticides and compost. Four statements dealt with bio-pesticides, and four dealt with compost. Farmers' degree of familiarity with the target organic practices for each statement was measured by a 5-pointLikert-type scale with 1= Very Familiar, 2= Familiar, 3= Somewhat Familiar, 4= Not Familiar, and 5= Not at all Familiar.

Section 5 included items about farmers' attitude toward target organic vegetable production practices. In this section, farmers were asked their level of agreement with 18 attitudinal statements on the target organic practices. Among the 18 statements, six statements [1] expressed images of organic farming and 12 statements expressed attitudes toward the organic practices. Farmers' level of agreement with each statement was measured by a 5-point Likert-type scale with 1= Strongly Agree, 2= Agree, 3= Neutral, 4= Disagree, and 5= Strongly Disagree.

Section 6 included items about farmers' intention to adopt the target organic vegetable production practices. First, farmers were asked if they had already adopted the target organic practices. For those who answered "No" to the question, they were asked their degree of likeliness to adopt these practices, with six statements on the target organic practices. Three statements dealt with bio-pesticides, and three statements dealt with compost. Farmers' degree of intention to adopt the organic practices was measured by a 5 point Likert-type scale with 1= I will likely convert, 2= I may convert, 3= I am not sure, 4= I may not convert, and 5= I will likely not convert.

Lastly, section 7 includes background and demographics questions. Farmers and their immediate family members were asked their gender, age, educational level, occupation and distance from their house to the pilot farms.

Data Collection

The following topics were discussed related to data collection: selection of research assistants, informing local authorities, research assistant training, oral translations, and data collection.

Selection of Research Assistants

Two research assistants named A in West Java and B in Bali were contracted for the face-to-face survey. A was born and raised in the Sukagalih village, West Java. A

---

[1] The six statements were not used for data analysis because the researcher changed some research objectives after data collection.

completed high school and her parents were vegetable farmers. The researcher hired A in July 2007, ten days before data collection.

B had lived in Bangli village, Bali for about seven years since her marriage. Her husband was born and raised in Bangli. B had a bachelor's degree and was growing vegetables for family consumption. The researcher hired B in September 2007, two weeks before data collection.

Both A and B knew the agricultural system and the community of their respective study sites. They had a higher level of education than most in their villages, and they could communicate well with the researcher in Bahasa Indonesia. Moreover, they spoke the local languages: Bahasa Sunda in West Java and Bahasa Bali in Bali.

Informing Local Authorities

The researcher was introduced by the Indonesian DNBAF project researchers to the local authorities in West Java and Bali. The district director, the sub-district directors, the directors of extension office in the sub-districts, and the villages' representatives were informed about the research objectives and the survey schedule.

Research Assistant Training

The research assistants received two days of training on survey procedures. On the first day, a questionnaire was given to the assistants and the researcher explaining the survey, including research objectives, contents of the questionnaire, and things research assistant would do. The assistants had two main tasks: guide the researcher to the respondents' house or farm, and support the researcher's verbal communication with respondents as an interpreter. On the second day, the assistants practiced a role-play interview with the researcher, whereby the researcher interviewed with an assistant's friend in Bahasa Indonesia while the assistants interpreted the researcher's sentences for the friend in the local language, and vice versa.

Data Collection

The face-to-face survey was conducted by the researcher. The interviews were conducted from nine o'clock in the morning to nine o'clock in the evening (except meal times), when the respondents were available. Research assistants guided the researcher to the respondents' homes. Before the interview, the researcher introduced herself and tried to engage in small talk to make respondents comfortable. After a brief conversation, the researcher asked respondents if they could spend about an hour to answer the questions. If they said yes, the interviews were started. If they requested another time, the researcher re-visited them when they were available. During the survey, the researcher instructed the respondents on each question without influencing the answer. Moreover, the researcher recorded data that she observed from the respondents on the questionnaire. At the end of the interview, the researcher checked the completed questionnaire to make sure all of the data were recorded correctly and thanked the respondents' participation for the interview. Research assistants supported the researcher's verbal communication with respondents when necessary.

Data Analysis

Data were coded and entered in SPSS. Net revenues for each vegetable's production were calculated by hand for the data entry. Since all data were collected and entered into SPSS by the researcher, there were no missing data in the data set.

Net Revenue of Vegetable Production

To analyze net revenue of vegetable production, it is best to organize income and expenses or cost into major categories. Total income from vegetable production is the sum of periodical sales transactions. Usually costs are recognized as either: 1) a variable cost; or 2) a fixed cost. Variable costs are expenses that occur only if a vegetable is grown, and change as output changes. Farmers often think of variable costs as out-of-pocket expenses. Variable costs generally include numerous cultural production expenses, such as the seed/plant costs, pest control management costs, labor costs, interest on borrowed money, and marketing expenses. Fixed costs usually remain the same irrespective of how much vegetable yield is produced. Total fixed cost does not change with output. Fixed costs include land, equipment and machinery, and property taxes (Estes, et al., 2003).

To calculate net revenue of a vegetable's production, the gross income and total cost information is needed. Gross income for vegetable production is the total quantity sold times the price it was sold and summed over a harvest season. Total cost is the sum of variable costs and fixed costs over a harvest season. Net revenue is obtained by subtracting the total cost from the gross income. Given the range of areas planted by vegetable farmers, it is useful to convert net revenue to a per unit basis (Estes, et al., 2003). Therefore, this study used total cost and net revenue per 0.1 hectare because the average plot area per harvest season of vegetable farmers in the study sites was less than 0.2 hectare.

Descriptive

Descriptive statistics, percentage, mean, and standard deviation were used to describe:

(1) Vegetable production systems in the study sites.

(2) Characteristics of respondents (vegetable farmers). The variables analyzed were: gender, age, education level, household size, number of family laborers, farming experience, farm size, distance to the pilot farms, irrigation sources, land tenure status, net revenue of cabbage, tomato, and/or carrot production, exposure to the pilot organic farm, and the information source for vegetable production practices.

(3) Farmers' awareness of bio-pesticides and compost.

(4) Farmers' attitudes toward bio-pesticide and compost. The following items were analyzed: relative advantage, compatibility, complexity, trialability and observability.

(5) Adoption rate of bio-pesticides and compost.

(6) Intention to adopt bio-pesticides and compost in near future.

T-test

T-test was used to compare:

(1) Mean scores of explanatory variables between familiarity and non-familiarity with bio-pesticides and,

(2) Mean scores of explanatory variables between familiarity and on-familiarity with compost. The explanatory variables were: gender, age, education level, household size, number of family laborers, farming experience, farm size, distance to the pilot organic farms, irrigation sources, land tenure status, net revenue of cabbage, tomato, and/or carrot production, exposure to the pilot farm, and information source for vegetable production practices.

Validity

To make sure the questionnaire was valid (Weiss, 1998), it was reviewed and evaluated by the dissertation advisor, the Japanese DNBAF project leader, and the project researchers in Indonesia. They provided feedback on the questionnaire and it was modified based on the feedback.

Reliability

For internal-consistency checks (Weiss, 1998), the questionnaire was translated into Bahasa Indonesia and tested by five Indonesian people, including a graduate student at Michigan State University (MSU) and vegetable farmers in West Java. Modifications were made based on the responses. In addition, Cronbach's alpha was used to measure the internal consistency of the statements assessing farmers' awareness of and attitude toward the target organic practices. According to Koshio (2004), there is a high internal-consistency of the material if the alpha value is greater than 0.7; however, if the alpha value is less than 0.5, the measurement of the material may need to be reconsidered.

Summated Scales

The following variables' scales were summated to use for binary logit analysis and path analysis. The variables were: farmers' awareness of the target organic practices, farmers' attitudes toward organic vegetable practices, and intention to adopt organic practices. Table 6 shows summary of summated scales.

Table 6. Summary of Summated Scales

Construct	Number of items	Range Min	Range Max	Mean (SD) West Java (N=107)	Mean (SD) Bali (N=103)	Mean (SD) Total (N=210)
Familiarity with bio-pesticides	4	4	20	10.98 (3.7)	14.00 (2.6)	12.46 (3.6)
Familiarity with compost	4	4	20	8.91 (2.8)	10.45 (3.1)	9.66 (3.0)
Attitude toward the target organic vegetable practices	12	12	60	27.92 (5.4)	28.00 (5.4)	27.96 (5.4)
Intention to adopt bio-pesticides	3	3	15	9.16 (4.0)	7.43 (3.2)	8.31 (3.7)
Intention to adopt compost	3	3	15	8.69 (4.2)	9.44 (4.2)	9.03 (4.2)

Logistic Regression Analysis

Since the multiple regression model with discrete dependant variables (the linear probability model) has certain drawbacks, it can produce predicted probabilities that are less than zero or greater than one, and the partial effect of any explanatory variables is constant; the logistic regression model is appropriate if the dependant variable involves two or more discrete/qualitative variables (Cramer, 2003; Pindyck and Rubinfeld, 1998; Wooldridge, 2000). The binary logit model is one of the logistic models which have dichotomous dependent variables such that Y is dependant variable where: $Y = 0$ if $Y < 16$ and $Y = 1$ if $Y \geq 16$ (Dwyer, 1983). The binary logit model is a very popular method to analyze the factors influencing decision making in the field of agriculture, such as adoption of new technologies (Cavane, 2007; Banerjee, et al., 2008; Zhou, et al., 2008).

Suppose dependent variable Y_i is a scalar which can take only two values, 0 and 1. The event $Y_i = 1$ is habitually designated as a success of the experiment, and $Y_i = 0$ as a failure (Cramer, 2003). In the present study I have

$Y_i = 1$ if vegetable farmer i is familiar with the target organic vegetable practices,

$Y_i = 0$ otherwise.

According to the basic econometric text books (Pindyck and Rubinfeld, 1998; Wooldridge, 2000; Gujarati, 1995), the logit model is based on the cumulative logistic probability function and is specified as:

$$P_i = [e^{\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta i X i} / 1 + e^{\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta i X i}] \text{ (eq.1)}$$

Where: P_i is a probability when $Y_i = 1$ and X_i is an explanatory variable. β_i are unknown but fixed parameters known as the regression coefficient.

Odds ratio is identified by $[P_i / 1 - P_i]$ and, it can be derived in equation 2 from equation 1 by taking the natural log of the odds ratio:

$$L_i = \log [P_i / (1 - P_i)] = \alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_i X_i \text{ (eq.2)}$$

L is called the logit, and hence equation 2 is called the logit model.

Interpretation of the Logit Model

The coefficients give the signs of the partial effects of each X_i on the response probability, and the statistical significance of X_i is determined by whether one can reject a null hypothesis; H_0: $\beta_i = 0$ at a sufficiently small significance level (Wooldridge, 2000).

The intercept α is the value of the log-odds in the success of the experiment Y_i if all X_is are zero. This interception may not have any physical meaning. β_i, the slope, measures the change in L for a unit change in X (Gujarati, 1995).

Probably the best measure of association for causal analysis of dichotomous variables is the odds ratio. The odds ratio ranges from zero to infinity. If the odds ratios of explanatory variables are close to one, there are likely no relationships between the dependent variable and the explanatory variables (Dwyer, 1983).

Binary Logit Analysis

A binary logit analysis was performed to determine the factors associated with awareness of bio-pesticides and compost. Definitions of variables used in the logit model are listed in Table 7. Two dichotomous dependent variables (Y) were created based on the results of the summated scales. (1) Familiarity with bio-pesticides is a dependent variable where $Y = 1$ if $Y < 12.46$ and $Y = 0$ if $Y \geq 12.46$; in other word, if respondent is familiar with bio-pesticides = 1 and if not familiar = 0 (F_BIO). (2) Familiarity with compost is a dependent variable where $Y = 1$ if $Y < 9.66$ and $Y = 0$ if $Y \geq 9.66$; in other word, if respondent is familiar with compost = 1 and if not familiar = 0 (F_COMP).

Table 7. Variables Definition in the Binary Logit Model

Variables	Definition
Dependent Variables	
F_BIO	Familiarity with bio-pesticides (familiar = 1, not familiar = 0)
F_COMP	Familiarity with compost (familiar = 1, not familiar = 0)
Explanatory Variables	
LOCA	Location of respondent (West Java = 1, Bali = 0)
GEN	Gender of respondent (male = 1, female = 0)
AGE	Age of respondent (year)
EDU2	Education level of respondent (some primary school = 1, other = 0)
EDU3	Education level of respondent (completed primary school = 1, other = 0)
EDU4	Education level of respondent (completed junior high school = 1, other = 0)
EDU5	Education level of respondent (completed high school = 1, other = 0)
HS	Household size of respondent
FL	Number of farming labor force in a household
EXPERIENCE	Farming experience of respondent (year)
FARM	Area of the farm (unit: are; 1 ha = 100 a)
DIS	Distance from respondent's house to the pilot farm (km)
DIRR	Irrigation dummy (have irrigation = 1, no irrigation = 0)
DLAND	Land tenure dummy (secure land tenure = 1, unscure land tenure = 0)
CNETREV	Net revenue of cabbage production (thousand rupia / 0.5 ha)
TNETREV	Net revenue of tomato production (thousand rupia / 0.5 ha)
WNETREV	Net revenue of carrot production (thousand rupia / 0.5 ha)
EXPO	Total number of "exposure question" checks
IFG_MEDIA	Total number of "information source question" checks: TV, radio, magazine/journal, internet (media information group)
IFG_EXTEN	Total number of "information source question" checks: extension agent, NGO, university (extension information group)
IFG_FARMER	Total number of "information source question" checks: farmers' group, organic farmers, other farmers, family member, self-study (farmer information group)
IFG_COMMER	Total number of "information source" checks: market people, commercial company/agricultural retail store (commercial information group)

Note: EDU variables compare familiarity with bio-pesticides relative to vegetable farmers with educational level of no schooling (EDU1).

Explanatory variables include location of respondent (LOCA), gender of respondent (GEN), age of respondent (AGE), five dummies for education level (EDU), household size of respondent (HS), number of farming family labor (FL), farming experience of respondent (EXPERIENCE), area of the farm (FARM), distance from respondent's house to the pilot farm (DIS), irrigation dummy variable if respondent has an irrigation = 1 and if no irrigation = 0 (DIRR), land tenure status dummy if respondent has secure land tenure = 1 and if unsecure land tenure = 0 (DLAND), net revenue of cabbage production in Indonesian rupia per 0.5 hectare (CNETREV), net revenue of tomato production in Indonesian rupia per 0.5 hectare (TNETREV), net revenue of carrot production in Indonesian rupia per 0.5 hectare (WNETREV), total number of "information source question[2]" checks for media information source group including TV, radio, magazine/journal and internet (IFG_MEDIA), total number of "information source question" checks for extension information group including extension agent, NGO, university (IFG_EXTEN), total number of "information source question" checks for farmer information source group including farmers' group, organic farmers, other farmers, family member and self-study (IFG_FARMER) and total number of "information source" checks for commercial information source group including market people, commercial company/agricultural retail store (IFG_COMMER). In addition, variable of exposure to the pilot farm was identified as total number of "exposure question[2]" checks (EXPO).

Path Analysis

Structural equation model (SEM) is used to analyze the technology adoption model in different fields including agriculture (Adrian, et al., 2005; Calantone, et al.,

[2] See Appendix C

2006; Bayard and Jolly, 2007). Path analysis is one of the SEMs. It is also referred to as SEM without latent variables (Toyota, 1998) and as simultaneous equation model in the field of econometrics (Kaplan, 2000).

In the path analysis, structural parameters and coefficients which represent hypothesized relationships among a set of observed variables are estimated by utilizing software programs such as SPSS, AMOS and EQS. The set of relationships among the variables can be modeled in terms of systems of equations and a path diagram is drawn as usual (Kaplan, 2000).

A path analysis was performed to confirm the hypothesis that farmers' familiarity with the target organic methods may affect their attitude toward the target organic methods in terms of relative advantage, compatibility, complexity, trialability, and observability. Also it may be possible to increase the chance that the farmer will adopt organic farming by changing attitudes toward the target organic methods.

Measurement items and scale reliabilities were summarized in Table 8.

Table 8. Results of the Analysis of Scales Using Cronbach's Alpha

Construct	Item
Familiarity of bio-pesticide ($\alpha = 0.89$)	▪ How familiar are you with a word of bio-pesticide? ▪ How familiar are you with raw materials for making bio-pesticides? ▪ How familiar are you with how to make bio-pesticides? ▪ How familiar are you on use of bio-pesticides?
Familiarity of compost ($\alpha = 0.87$)	▪ How familiar are you with a word of compost/bokashi? ▪ How familiar are you with raw materials for making compost/bokashi? ▪ How familiar are you with how to make compost/bokashi? ▪ How familiar are you with the use of compost/bokashi?
Attitude toward the target organic vegetable practices ($\alpha = 0.80$)	▪ Using bio-pesticides to control insect pests can reduce production costs. ▪ Using only compost to grow vegetables can reduce production costs. ▪ Using bio-pesticides to control insect pests is a good fit with my culture. ▪ Using bio-pesticides to control insect pests is a good fit with my experience. ▪ Using only compost to grow vegetables is a good fit with my culture. ▪ Using only compost to grow vegetables is a good fit with my experience. ▪ Using bio-pesticides to control pests is easy. ▪ Using only compost to grow vegetables is easy. ▪ Bio-pesticides can be tested in a small part of my field to control insect pests. ▪ Compost can be tested in a small part of my field. ▪ People can easily see a difference between vegetables grown using bio-pesticides and vegetables grown using synthetic insecticide to control insect pests. ▪ People can easily see a difference between vegetables grown using only compost and vegetables grown using synthetic fertilizer.
Intention to adopt bio-pesticide ($\alpha = 0.99$)	▪ I intend to adopt the use of only compost for cabbage production. ▪ I intend to adopt the use of only compost for tomato production. ▪ I intend to adopt the use of only compost for carrot production.
Intention to adopt compost ($\alpha = 0.99$)	▪ I intend to adopt the use of bio-pesticides for cabbage production. ▪ I intend to adopt the use of bio-pesticides for tomato production. ▪ I intend to adopt the use of bio-pesticides for carrot production.

Familiarity with bio-pesticides

Familiarity with bio-pesticides refers to a person who becomes aware of a bio-pesticide and gains some understanding of how it functions. The four-item scale (with 1= Very Familiar, 2= Familiar, 3= Somewhat Familiar, 4= Not Familiar, and 5= Not at all Familiar) used to measure familiarity with bio-pesticide use included (1) How familiar are you with the word "bio-pesticide?" (2) How familiar are you with raw materials for making bio-pesticides? (3) How familiar are you about how bio-pesticides are made? (4) How familiar are you about the use of bio-pesticides? The Cronbach's alpha for the familiarity with bio-pesticide scale was 0.89.

Familiarity with compost

Familiarity with compost refers to a person who becomes aware of compost and gains some understanding of how it functions. The four-item scale (with 1= Very Familiar, 2= Familiar, 3= Somewhat Familiar, 4= Not Familiar, and 5= Not at all Familiar) was used to measure familiarity with compost included (1) How familiar are you with the word "compost/bokashi?" (2) How familiar are you with raw materials for making compost/bokashi? (3) How familiar are you with making compost/bokashi? (4) How familiar are you with the use of compost/bokashi? The Cronbach's alpha for the familiarity with compost scale was 0.87.

Attitude toward target organic vegetable practices

The attitude toward target organic vegetable practices is the degree of a favorable or an unfavorable attitude toward the use of bio-pesticides and compost. The attitude has five characteristics including relative advantage, compatibility, complexity, traiability and observability (Rogers, 1995). Relative advantage is the degree to which an innovation is perceived as being better than the idea it supersedes. The degree of relative advantage is often expressed as economic profitability (Rogers, 1995). Compatibility is the degree to which a new idea is perceived as consistent with the existing value, past experiences, and needs of potential adopters (Rogers, 1995). Complexity is the degree to which a new idea is perceived as relatively difficult to understand and use (Rogers, 1995). Trialability is the degree to which a new idea may be experimented with on a limited basis. Innovations that can be tried on the installment plan are generally adopted more rapidly than ones that are not divisible (Rogers, 1995). Observability is the degree to which the results of a new idea are visible to others (Rogers, 1995). The twelve-item scale (with 1= Strongly Agree, 2= Agree, 3= Neutral, 4= Disagree, and 5= Strongly Disagree) used to measure attitude toward the target organic vegetable practices was developed based on the definitions of the five characteristics. They were: (1) using bio-pesticides to control insects/pests can reduce production costs, (2) using only compost to grow vegetables can reduce production costs, (3) using bio-pesticides to control insects/pests is a good fit with my culture, (4) using bio-pesticides to control insects/pests is a good fit with my experience, (5) using only compost to grow vegetables is a good fit with my culture, (6) using only compost to grow vegetables is a good fit with my experience, (7) using bio-pesticides to control pests is easy, (8) using only compost to grow vegetables is easy, (9) biopesticides can be tested in a small part of my field to control insects/pests, (10) compost can be tested for use to grow vegetables in a small part of my field, (11) people can easily see a difference between vegetables grown using bio-pesticides and vegetables grown using synthetic insecticide to control insects/pests, and (12) people can easily see a difference between vegetables grown using only compost and vegetables grown using synthetic fertilizer. The Cronbach's alpha for attitude toward the target organic vegetable practices scale was 0.80.

Intention to adopt bio-pesticides

The intention to adopt bio-pesticides is the strength of the adopter's intention to support the decision to use bio-pesticides. The three-item scale (with 1= I will likely convert, 2= I may convert, 3= I am not sure, 4= I may not convert, and 5= I will likely not convert) used to measure intention to adopt bio-pesticides included (1) I intend to adopt and use bio-pesticides for cabbage production. (2) I intend to adopt and use bio-pesticides for tomato production. (3) I intend to adopt and use bio-pesticides for carrot production. The Cronbach's alpha for intention to adopt bio-pesticide scale was 0.99.

Intention to adopt compost

The intention to adopt compost is the strength of the adopter's intention to support the decision to use compost. The three-item scale (with 1= I will likely convert, 2= I may convert, 3= I am not sure, 4= I may not convert, and 5= I will likely not convert) used to measure intention to adopt compost included (1) I intend to adopt and use only compost for cabbage production. (2) I intend to adopt and use only compost for tomato production. (3) I intend to adopt and use only compost for carrot production. The Cronbach's alpha for intention to adopt compost scale was 0.99.

Amos 18 was used for the path analysis.

Interviews with Key Informants

Background

Interviews with key informants were scheduled to answer research question eight of this study. The interviews provided the most current information regarding organic farming policy, the agricultural extension system, and the organic vegetable marketing system in West Java and Bali, Indonesia.

Interview Participants

A snowball sampling was used in this study to collect detailed information from persons representing the Department of Agriculture, the agricultural extension agency, and people in an organic vegetable market channel in the study area. For representatives from the Department of Agriculture, one government officer at the Quality and Standardization Bureau of the Department of Agriculture was identified. Drafts of organic agricultural policy have been developed by the bureau. For agricultural extension agency personnel at sub-district level, two extension workers were identified in both West Java and Bali. They have served as vegetable production specialists in the study sites. For people in an organic vegetable marketing system, two organic farmers who have been doing direct selling of organic vegetables were identified in both West Java and Bali. All key informant interviews were scheduled by phone with a subsequent personal face-to-face meeting, and were interviewed by the researcher in Bahasa Indonesia.

Interview Schedule Development

The interview questions were developed to obtain information regarding current organic agricultural policy, extension systems and marketing systems of organic farming in Indonesia. Appropriate changes were made to the questions through an expert panel review process. Interview schedules[3] were developed to collect accurate and verbal data smoothly (Berg, 2004).

---

[3] See Appendix D

Interview Process

Interview participants were identified by consulting with faculty members at Bogor Agricultural University and Udayana University, who took part in the DNBAF project.

Interviews were conducted by following the interview schedule described by Kumu (2002). Each interviewing schedule had three major components: opening, body and closing. The opening was needed to make the interviewee feel welcomed and relaxed. Moreover, the opening needed to indicate clearly the objectives of the interview, and made it clear what topic area was being addressed. It was good if the interviewer could provide some information to motivate the respondent to answer the questions. It was also important to indicate the expected length of the interview. The body of the interview schedule listed the topics to be covered and potential questions. The schedule still allowed some freedom to probe into answers and adapt to the situation. The closing needed to maintain the tone set throughout the interview and was brief but not abrupt. It was good to discuss the next course of action to be taken, and the interviewer thanked the interviewee for his or her time.

The interviewer took notes during the interview process to formulate new questions and to clarify some additional points and details. After the interviews, field notes were made for each interviewee. Finally, the verbal data were summarized based on the field notes.

Limitation of the Study

Since the study sites were rural areas of Indonesia, the societies were male-centered, conservative, and had major religious component (both Islam and Hindu). From the viewpoint of the respondents, the researcher was a foreign, female stranger. Also, it was a rare event that such a stranger, including the research assistant, lived with farmers and conducted surveys in the study sites. Thus, the possibility existed for some threat bias, hostility bias (Alreck and Settle, 1995) and politeness bias. To remove these biases, the researcher made efforts to blend into the rural societies by staying at a farmer's house, eating the same foods as the farmers, following the societies' customs, attending the communities' activities, and learning the local languages during the survey period.

The scales of awareness of, attitude toward, and intention to adopt the target organic practices were used for the first time to **determine farmers' perceptions of organic vegetable production practices. The awareness of, attitude toward, and intention to adopt bio-pesticides and compost expressed by respondents in the study sites may not generalize to other populations.**

CHAPTER IV

RESULTS

The results presented in this chapter are based on data collected from face-to-face surveys and interviews with key people in West Java and Bali. The findings presented follow the specific research objectives for this study.

Vegetable Production System in the Study Area

The first research objective of this study was to describe vegetable production systems involving target vegetables (cabbage, tomato and carrot) in the study sites. First, aspects of vegetable production systems in both study sites in West Java and Bali are discussed. After that, vegetable production systems of target vegetables are discussed.

Aspects of Vegetable Production Systems

Geographical conditions of the study sites were very similar. The study sites were located in hilly, high-altitude, cool areas, and were famous centers for vegetable production. Table 9 shows harvested areas of the major vegetable crops in the study sites in 2006. Common vegetables and staples were grown in both sites.

However, there was one significant difference between the study sites. In Bali, almost all of the farmers had irrigation, but in West Java about 30 percent of the farmers did not. Farmers who did not have irrigation could grow only a few vegetable crops during the May to September dry season.

Availability of irrigation could influence vegetable production systems in West Java and Bali. Irrigation influences the cropping pattern and *tumpangsaei*.

Table 9. Harvested Area under Different Crops in the Study Sites in 2006

Item	Harvested area (ha)	
	Sukagalih (West Java)	Bangli (Bali)
Leek	14*	N/A
Cabbage	12*	117
Chinese cabbage/Mustard green	18	114
Carrot	12	13
Chili	22	135
Tomato	10	93
Beans	6	102
Cucumber	3	47
Rice	240	173
Corn	24	75
Sweet Potato	36	0

*Data of leek and cabbage in West Java were used from Rudi (2005). N/A indicates data not available.
Source: UPTD Penyuluhan Wilaya Ciawi, 2007; UPTD Pertanian Tanaman Pagan Kec. Batriti , 2007.

Cropping Pattern

West Java

There were various annual cropping rotations in the study sites. According to the Ciawi extension office (2007), these were typical cropping rotations in the West Java study site. Table 10 summarized the cropping rotations.

Table 10. Typical Cropping Rotations in the Sub-District of Megamendung

Type of farming land	Annual cropping rotations
Rice field	1. Rice – rice – rice 2. Rice – vegetables - vegetables 3. Rice – cereals except rice - vegetables
Non-rice field	4. Vegetables –vegetables - vegetables 5. Vegetables – cereals except rice - vegetables

Source: UPTD Penyuluhan Wilaya Ciawi, 2007.

In the study site, farmers in the southern part practiced the cropping rotations 2 and 3. Farmers in the northern part practiced cropping rotations 4 and 5.

Farmers tended to choose vegetable varieties that had a high market value when planning their cropping rotation for the next harvest season, because Indonesian vegetable markets did not have governmental price adjustments. From the survey, various cropping rotations were found in the study site. In the southern part, examples of the cropping rotations were: rice – tomato – cabbage, rice – chili – beans, rice – sweet potato – Chinese cabbage, and rice – tomato – corn. In the northern part, examples of the cropping rotations were: cabbage – tomato – mustard green, Chinese cabbage – leek – carrot, beans - chili – cauliflower, broccoli – carrot – beans, and corn – chili – mustard green. However, farmers who did not have irrigation needed to choose crops that tolerated dry conditions, such as chili and sweet potato. Unfortunately, market prices for these crops slumped when too many farmers grew and sold the same crops during the same time. Thus some farmers left their farm land fallow during the dry season.

Bali

The study site in Bali had very similar situations to West Java, except for some cropping rotations. Farmers did not leave their farm land fallow during the dry season because almost all of them had irrigation. Some farmers in the southern part of the study site planted rice twice a year. The examples of these cropping rotations: rice – beans – rice, rice – mustard green – rice, rice – rice – corn, and rice – rice – tomato.

Tumpangsari

According to Dinata, et al. (2001), *Tumpangsari* is a multiple cropping system "where more than two crops co-exist simultaneously and share both time and space in the same field" (p.331). Multi cropping systems, including *Tumpangsari,* may increase productivity of land, make more efficient use of resources, and reduce risks of total crop failure. According to Fujimoto and Miyaura (1997), *Tumpangsari* has been practiced in vegetable production for a long time in Indonesia and especially in West Java; *Tumpangsari* predominated in some vegetable production areas.

In the West Java study site, *Tumpangsari* was observed frequently, including the BNBAF project pilot farm. However, *Tumpangsari* was not practiced in the Bali study site. Availability of irrigation was one of the main reasons for this. Since farmers in West Java had a higher risk of loss pertaining to the lack of irrigation water than farmers in Bali, farmers in West Java practiced *Tumpangsari* frequently to reduce that risk in their vegetable production. Figure 9 is a picture of an example of *Tumpangsari* in the study site of West Java. The picture shows that more than two crops were planted in each plot. For example, sweet potatoes and corn were planted in the same plot at the left-hand side of the picture; beans and carrots for seed production were planted together in the center of the picture.

Figure 9. Example of *Tumpangsari* in the West Java study site.

The Target Vegetable Production Systems

The target vegetables for this study were cabbage, tomato, and carrot.

Cabbage

Cabbage is grown in the study areas. Respondents were asked about their cabbage production during the interviews.

Table 11 shows a summary of cabbage production in West Java and Bali.

In West Java, about 20 percent of the respondents grew cabbage at least once a year from July 2006 to June 2007. Average plot area/harvest season was 0.206 hectare. A harvest season for cabbage was about 3 months in Indonesia.

Table 11. Summary of Cabbage Production in West Java and Bali

		West Java (N= 22)	Bali (N= 40)
Average plot area / harvest season (ha)		0.206	0.161
Seed			
Variety	Green 11	20	26
	Green 22	1	2
	Rontan	1	0
	Sunbarat	0	5
	Mustika	0	2
	Sumit	0	3
	Probit	0	3
Average number of seedlings planted/0.1 ha		2488.4	2082.2
Average seedling cost (Rp/plant)		18.0	17.7
Fertilizer			
	Organic	100 %	95 %
	Inorganic	77.3 %	100 %
	Both	77.3 %	95 %
Average fertilizer cost (Rp/0.1 ha)		233,773	163,103
Pesticide			
	Organic	22.7 %	0 %
	Inorganic	81.8 %	100 %
	Both	4.5 %	0 %
Average pesticide cost (Rp/0.1 ha)		132,204	112,959
Labor (average cost: Rp/0.1 ha)			
Male labor		603,980	57,331
Female labor		156,705	30,411
Total labor		760,686	87,742
Marketing			
Average marketing expenses (Rp/0.1 ha)		123,166	34,522
Immediate sale destination	Village collector	72.7%	82.5%
	Local market	9.1 %	17.5 %
	Jakarta market	9.1 %	0 %
	BNBAF project	4.5 %	0 %
	Consumer direct	4.5 %	0 %
Require grading?	Yes	40.9 %	20.0 %
	No	59.1 %	80.0 %
Marketing method	Individually	31.8 %	55.0 %
	Borongan	68.2 %	45.0 %
Loan			
Availability of loans	Yes	22.7 %	50.0 %
Average price (Rp/kg)		1,209.1	859.3
Average production (kg/0.1 ha)		1,916.4	1,987.2
Average gross income (Rp/0.1 ha)		1,799,714	1,402,405
Average net revenue (Rp/0.1 ha)		922,093	940,540

Note: Exchange rate of US dollar to Indonesian rupiah in December, 2009 was: \$1= Rp. 9,450.

Three seed varieties: Green 11, Green 22 and Rontan, were commonly planted, with Green 11 most common. Average number of seed planted/0.1 hectare was 2,488, with seedling cost of 18 Rp/plant. All farmers used organic and 77 percent of them used inorganic fertilizers. In pesticide application, about 23 percent of farmers used organic and 81 percent of them used inorganic pesticides. Both organic and inorganic pesticides were used by 4.5 percent of farmers. On an average, male labor costs was about four times higher than female labor. From the data, the range of male wages per day was from 12,750 Rp to 20,000 Rp, and female wage was from 6,000 Rp to 10,000 Rp. Traditionally, typical small farmers in West Java worked on other farmers' farms for half a day (7 a.m. to 12 p.m.) as a laborer, then they returned to their own farms for the rest of a day (2 p.m. to 6 p.m.). Thus, daily wages meant five hours of labor. A majority of farmers sold cabbage to village collectors (73 percent), and by *Borongan*[1] (68 percent). Also, 40 percent of the cabbage had to grade to sell. In terms of production loans, 20 percent of farmers indicated they obtained a loan. Average price and production per 0.1 hectare were 1,209 Rp/kg and 1,916 kg respectively. The ratio of total production costs to gross income was 49 percent was for cabbage production (calculated using average gross income per 0.1 hectare and average net revenue per 0.1 hectare).

In Bali, more than 38 percent of the respondents grew cabbage at least once a year from September 2006 to August 2007. The average plot area for each harvest season was 0.161 hectare. An average harvest season for cabbage was about 3 months. Six seed varieties (Green 11, Green 22, Sunbarat, Mustika, Sumit and Probit) were planted, with most of the farmers choosing Green 11. Average number of seeds planted/0.1 hectare was

[1] An Indonesian marketing method that farmers sell all of a product to a broker before harvest for a certain price and the broker owes for harvest work and costs.

2,082 with seedling costs about 18 Rp / plant. In fertilizer application, 95 percent used organic and all used inorganic fertilizers. In pesticide application, none used organic and all used inorganic pesticides. Use of male labor cost about twice that of female labor, and the average total labor costs in Bali (Rp 87,742) being much lower than West Java (Rp 760,686). From the data, the range of daily male wages was from 20,000 Rp to 30, 000 Rp, and daily female wages was from 15,000 Rp to 30,000 Rp. When farmers in Bali worked on other farmers' farms as a laborer, it was for an entire day (7 a.m. to 5 p.m.). Thus daily wages means a wage for eight hours. A majority of farmers marketed their cabbage to village collectors (82 percent) or by individual (55 percent). Also, 20 percent of the cabbage crop had to grade to sell. Half of the farmers obtained loans. Average price and average production per 0.1 hectare in the periods were 859 Rp/kg and 1,987 kg respectively. The ratio of total production cost to the gross income of a cabbage production was 33 percent, calculated using average gross income per 0.1 hectare and average net revenue per 0.1 hectare.

Tomato

Respondents were asked about tomato production on their farm.

Table 12 shows summary of tomato production in West Java and Bali.

In West Java, about 32 percent of the respondents grew tomato at least once from July 2006 to June 2007. Average plot area/harvest season was 0.194 hectare. Tomatoes were harvested for about three to five months, depending on the variety in Indonesia. Five seed varieties (Marthe, TW, Tomato Sayur, Antaralocal, and Permata) were planted, with most of the farmers planting Marthe. Average number of seedlings planted/0.1

hectare was 1,681, with seed costs about 44 Rp /plant. All farmers used organic fertilizers, and 85 percent of them used inorganic pesticides.

Table 12. Summary of Tomato Production in West Java and Bali

		West Java (N= 34)	Bali (N= 25)
Average plot area / harvest season (ha)		0.194	0.152
Seed			
Variety	Marthe	18	15
	TW	4	0
	Tomato Sayur	4	0
	Antaralocal	7	5
	Permata	2	3
	Spirit	0	2
Average number of seedlings planted/0.1 ha		1,681.1	1,665.8
Average seedling cost (Rp/plant)		43.8	31.1
Fertilizer			
	Organic	100 %	100 %
	Inorganic	79.4 %	96.0 %
	Both	79.4 %	96.0 %
Average fertilizer cost (Rp/0.1 ha)		302,291	195,632
Pesticide			
	Organic	14.7 %	4.0 %
	Inorganic	85.3 %	100 %
	Both	8.8 %	4.0 %
Average pesticide cost (Rp/0.1 ha)		190,444	340,151
Labor (average cost: Rp/0.1 ha)			
Male labor		657,990	190,657
Female labor		294,191	45,658
Total labor		952,182	236,315
Material cost (Average cost: Rp/0.1 ha)		158,488	300,070
Marketing			
Average marketing expenses (Rp/0.1 ha)		81,939	36,632
Immediate sale destination	Village collector	76.5 %	92.0 %
	Local market	17.6 %	8.0 %
	BNBAF project	2.9 %	0 %
	Consumer directly	2.9 %	0 %
Require grading?	Yes	55.9 %	80.0 %
	No	44.1 %	20.0 %
Marketing method	Individually	41.2 %	100.0 %
	Borongan	58.8 %	0 %
Loan			
Availability of loans	Yes	29.4 %	48.0 %
Average price (Rp/kg)		1,778.0	1,195.8
Average production (kg/0.1 ha)		1,644.7	1,651.4
Average gross income (Rp/0.1 ha)		2,400,438	1,922,275
Average net revenue (Rp/0.1 ha)		889,433	375,057

Note: Exchange rate of US dollar to Indonesian rupiah in December, 2009 was: $1= Rp. 9,450.

Both organic and inorganic pesticides accounted for 8.8 percent of use. On the average, male labor costs were about three times higher than female labor costs. From the data, the range of male wages per day was from 12,000 Rp to 25, 000 Rp, and female wages were from 6,000 Rp to 10,000 Rp. Typically, small farmers in West Java worked on other farmers' farms for half a day (7 a.m. to 12 p.m.) as a laborer, then work on their own farms for the rest of a day (2 p.m. to 6 p.m.). Thus, daily wages account for five hours of labor. A majority of farmers sold tomatoes to village collectors (77 percent), and by *Borongan* (59 percent). Also, 56 percent of tomatoes had to grade to sell. About 30 percent of farmers indicated they had obtained a loan. Average price and production per 0.1 hectare during this period were 1,778 Rp/kg and 1,645 kg respectively. The ratio of total production cost to the gross income of / tomato production was 63 percent, calculated using average gross income per 0.1 hectare and average net revenue per 0.1 hectare.

In Bali, more than 24 percent of respondents grew tomato at least once from September 2006 to August 2007. Average plot area/harvest season was 0.152 hectare. Cabbage harvest took place or about three to five months in Indonesia. Four seed varieties (Marthe, Antaralocal, Permata and Spirit) were planted, with farmers choosing Marthe most often. Average number of seed planted/0.1 hectare was 1,666 with seed costs about 31 Rp/plant. All farmers used organic fertilizers, and 96 percent used inorganic fertilizers. Four percent of farmers used organic pesticides and all of them used inorganic pesticides. On the average, male labor costs were about four times higher than female labor costs and the average total labor costs in Bali (Rp 236,315) was much lower than West Java (Rp 952,182). From the data, male daily wages ranged from 20,000 Rp to

25,000 Rp, and female wages ranged from 17,000 Rp to 20,000 Rp. When farmers in Bali worked on other farms as a laborer, it was for an entire day (7 a.m. to 5 p.m.). Thus a daily wage equaled eight hours of labor. A majority of farmers sold tomatoes to village collectors (92 percent), by individual (100 percent). Also, 80 percent of tomatoes had to grade to sell. About a half the farmers indicated obtaining a loan. Average price and average production per 0.1 hectare in the periods were 1,196 Rp/kg and 1,651 kg, respectively. The ratio of total production cost to the gross income for tomato production was 80 percent, using average gross income per 0.1 hectare and average net revenue per 0.1 hectare.

Carrot

Carrot is a popular vegetable in Indonesia. It is widely grown.

Table 13 shows summary of carrot production in West Java and Bali.

In West Java, more than 46 percent of the respondents grew carrot at least once from July 2006 to June 2007. Average plot area/harvest season was 0.179 hectare. Carrots were harvested for about three months. Two seed varieties (Local and Cianjur/Bandung) were planted, with most farmers choosing Local. Seventy-eight percent of farmers used organic fertilizers and 86 percent of them used inorganic fertilizers. Sixty-six percent of the farmers used both organic and inorganic fertilizers. In pesticide application, none used organic and 16 percent of them used inorganic pesticides. More than half of the total average labor costs (Rp 442,919) was for male labor (Rp 258, 516). From the data, the range of male wages per day was from 12,000 Rp to 25, 000 Rp, and female wages was from 5,000 Rp to 10,000 Rp. Typically, small farmers in West

Java worked on other farms for half a day (7 a.m. to 12 p.m.) as a laborer, then spent the rest of the day working on their own farms (2 p.m. to 6 p.m.). Thus, a daily wage meant laboring for five hours.

Table 13. Summary of Carrot Production in West Java and Bali

		West Java (N= 50)	Bali (N = 38)
Average plot area/harvest season (ha)		0.179	0.164
Seed			
Variety	Local	46	38
	Cianjur/Bandung	4	0
Average seedling cost (Rp/0.1 ha)		26,322	48,248
Fertilizer			
	Organic	78.0 %	34.2 %
	Inorganic	86.1 %	13.2 %
	Both	66.0 %	2.6 %
Average fertilizer cost (Rp/0.1 ha)		157,808	10,225
Pesticide			
	Organic	0 %	0 %
	Inorganic	16.0 %	5.3 %
	Both	0 %	0 %
Average pesticide cost (Rp/0.1 ha)		5,982	611
Labor (average cost: Rp/0.1 ha)			
Male labor		258,516	5,756
Female labor		184,402	14,148
Total labor		442,919	19,904
Marketing			
Average marketing expenses (Rp/0.1 ha)		12,903	2,773
Immediate sale destination	Village collectors	92.0 %	94.7 %
	Local market	4.0 %	5.3 %
	BNBAF project	2.0 %	0 %
	Consumer directly	2.0 %	0 %
Require grading?	Yes	6.0 %	50.0 %
	No	94.0 %	50.0 %
Marketing method	Individually	14.0 %	50.0 %
	Borongan	86.0 %	47.4 %
	Contract	0 %	2.6%
Loan			
Availability for loans	Yes	12.0 %	23.7 %
Average price (Rp/kg)		879.0	1,211.4
Average production (kg/0.1 ha)		1,098.4	1,010.8
Average gross income (Rp/0.1 ha)		845,695	1,119,647
Average net revenue (Rp/0.1 ha)		446,997	985,932

Note: Exchange rate of US dollar to Indonesian rupiah in December, 2009 was: $1= Rp. 9,450.

A majority of farmers sold carrots to village collectors (92 percent) by *Borongan* (86 percent). Also, only 6 percent of carrots had to grade to sell. In terms of production loan, 12 percent indicated obtaining a loan. Average price and production per 0.1 hectare were 879 Rp/kg and 1,098 kg, respectively, for each period. The ratio of total production costs to gross income for carrot production was 47 percent, calculated using average gross income per 0.1 hectare and average net revenue per 0.1 hectare.

In Bali, about 37 percent of the respondents grew carrots at least once within a year from September 2006 to August 2007. Average plot area/harvest season was 0.164 hectare. Carrots were harvested for about three month in Indonesia. Local was seed variety planted. In Thirty-four percent of farmers used organic fertilizers and 13 percent of them used inorganic fertilizers. About 3 percent used both organic and inorganic fertilizers. In pesticide applications, none used organic, and 5 percent used inorganic pesticides. More than half of the total average labor cost (Rp 19,904) was female labor cost (Rp 14,148) and Bali had lower average labor costs than West Java (Rp 442,919). From the data, the range of male daily wages was from 25,000 Rp to 27, 000 Rp, and female wage was 20,000 Rp. When farmers in Bali worked on other farms as a laborer, typically they did for a day (7 a.m. to 5 p.m.). Thus a daily wage meant laboring for eight hours. A majority of farmers sold carrots to village collectors (95 percent). There were three marketing methods: individual, *Borongan* and contract; percentages of each method were 50 percent, 47.4 percent, and 2.6 percent respectively. Half of the carrots had to grade to sell. In terms of production loans, about 24 percent of farmers indicated obtaining a loan. Average price and production per 0.1 hectare during the periods were 1,211 Rp/kg and 1,011 kg, respectively. The ratio of total production cost to the gross income of carrot production was 12 percent, calculated using average gross income per 0.1 hectare and average net revenue per 0.1 hectare.

Socio-Economic Characteristics of Vegetable Farmers

The second research objective of this study was to determine demographic-socio-economic characteristics of the respondents in the study sites.

The demographic and socio-economic characteristics of respondents in the two study sites are presented in Table 14.

Table. 14 Demographic and Socio-economic Characteristics

	West Java (N=107)		Bali (N=103)	
Variables	Mean	(SD)	Mean	(SD)
Age (years)	44.3	(13.8)	38.1	(8.9)
Household size (people)	4.8	(1.8)	3.6	(1.0)
Number of family laborers (people)	1.8	(0.7)	2.2	(0.6)
Farming experience (years)	14.3	(10.8)	21.1	(9.2)
Farm size (ha)*	0.59	(0.9)	0.65	(0.5)
Distance to the pilot farm (km)	0.9	(0.7)	1.6	(1.0)

* Number of respondents answering the question on farm size was 99.

The average ages of respondents in West Java and Bali were 44.3 years old and 39.1 years old, respectively. Average household sizes in West Java and Bali were 4.8 people and 3.6 people, respectively. Average number of family members who contributed to farm labor in West Java and Bali were 1.8 people and 2.2 people, respectively. Average years of farming experience for respondents in West Java and Bali were 14.3 years and 21.1 years, respectively. Average farm size in West Java and Bali was 0.59 hectare and 0.65 hectare, respectively. Average distance from respondents' house to the BNBAF project pilot farms was 0.9 km and 1.6 km, respectively.

All respondents in West Java were male. Most respondents in Bali (89.3 percent) were also male. One of the main reasons for the predominance of male respondents was that the study sites were in rural Indonesia, where the societies are male-centered, conservative, and have heavy religious influences from both Islam and Hindu faiths. When the researcher developed a list of respondents, all were male heads of households in West Java, and male heads of households also predominated in Bali. The researcher explored who was really involved in vegetable farming in a respondent's household during a short conversation before the actual interviews, and this was what the actual collected data showed.

Table 15 shows that the most frequent educational level of respondents in West Java (44.8 percent) was some primary school, and the most frequent educational level in Bali (44.7 percent) was completed primary school. This means that respondents in Bali had a slightly higher education level than in West Java.

Table 15. Educational Level

		West Java (N=107)		Bali (N=103)	
Variables		Number	%	Number	%
Educational level	No school	18	16.8	5	4.9
	Some primary school	48	44.8	14	13.6
	Completed primary school	37	34.6	46	44.7
	Completed junior high school	2	1.9	25	24.2
	Completed high school	2	1.9	13	12.6

Table 16. Respondents' Land Tenure Status in West Java and Bali

	West Java		Bali	
	Number	%	Number	%
Own	6	6.1	85	82.5
Rent	28	28.6	6	5.8
Use of public land at no cost	26	26.5	1	1.0
Use of private land at no cost	35	35.7	10	9.7
Mixed tenure	3	3.1	1	1.0
Total	98	100	103	100

Table 16 shows respondents' land tenure status[1].

In West Java, 6 percent of respondents owned their land, 28.6 percent rented farm land, 26 percent used public land for farming at no cost without authority, 35 percent used private land for farming at no cost without permission; and 3 percent of respondents had mixed land tenure. Use of public or private land at no cost was not stable. If the government decides to make a road on these lands, those farmers who use the public land at no cost have to leave the land immediately, even if the farmers have cultivated the land for a long time. In Bali, most respondents owned their own land (82.5 percent) and about 10 percent of respondents used either public land or private land at no cost without permission.

Table 17 showed respondents' irrigation resources[2]. In West Java, the majority of respondents had irrigation (73.5 percent), but 26.5 percent of respondents did not. In Bali, almost all respondents had irrigation (99 percent).

[1] In total, 37.8 % of respondents had unsecure land tenure status, including mixed tenure, and 62.2 % had secure land tenure status. Based on the result, this data were categorized into two groups: secure land tenure status and unsecure land tenure status. A dummy "land tenure status" variable was created to use for the binary logit analysis.

Table 17. Respondents' Irrigation Resources in West Java and Bali

	West Java		Bali	
	Number	%	Number	%
Stream/Spring	65	66.3	5	4.9
Reservoir	2	2.0	94	91.3
Home	2	2.0	1	1.0
Rainfall (No irrigation)	26	26.5	1	1.0
Mixed irrigation	3	3.1	2	1.9
Total	98	100	103	100

The nature and extent of respondents' exposure to the BNBAF project pilot farms in the two study sites are presented in Table 18.

Table 18. Respondents' Exposure to the BNBAF Project Pilot Farms in West Java and Bali

	West Java (N= 107)		Bali (N= 103)	
	Yes %	No %	Yes %	No %
Have you ever heard about the BNBAF project pilot farm?	31.8	68.2	9.7	90.3
Have you ever seen the pilot farm?	30.8	69.2	5.8	94.2
Have you ever talked with project people to learn about organic farming?	28.0	72.0	7.8	92.2
Have you ever visited the pilot farm?	27.1	72.9	5.8	94.2
Have you ever worked at the pilot farm?	1.9	98.1	0	100

In West Java, 31.8 percent of respondents had heard about the BNBAF project pilot farm; however, only 9.7 percent of respondents in Bali had heard about the pilot

[2] In total 13.4 % of respondents did not have irrigation and 86.6 % of respondents had irrigation. Based on the result, this data were categorized into two groups: have irrigation and no irrigation. This categorized data were named irrigation dummy variable and were used for binary logit analysis.

farm. In West Java, 30.8 percent of respondents had seen the BNBAF project pilot farm; however, only 5.8 percent of respondents in Bali had seen the pilot farm. In West Java, 28 percent of respondents had talked with project people to learn about organic farming; however, only 7.8 percent of respondents in Bali had talked with project people. In West Java, 27.1 percent of respondents had visited the BNBAF project pilot farm; however, only 5.8 percent of respondents in Bali had visited the pilot farm. In West Java, 1.9 percent of respondents had worked at the BNBAF project pilot farm, and 0 percent of respondents in Bali had worked at the pilot farm. This indicated that about a third of respondents in West Java were aware of the pilot farm, but less than 10 percent of respondents in Bali were aware of the pilot farm.

General Information Source on Vegetable Production

The respondents' information sources in the two study sites are presented in Table 19[1].

[1] Information sources were categorized into four groups for use in the binary logit analysis.

Table 19. Information Source for Vegetable Production in West Java and Bali

Information source group	Information sources	West Java (N= 107)		Bali (N = 103)	
		Number	%*	Number	%*
Farmer group	Farmers' group	40	37.4	31	30.1
	Organic farmers	13	12.1	3	2.9
	Other farmers	84	78.5	91	88.3
	Family members	6	5.6	2	1.9
Commercial group	Commercial companies (Agricultural retail stores)	23	21.5	77	74.8
	Market people	11	10.3	12	11.7
Extension group	Extension agents	33	30.8	45	43.7
	NGOs	2	1.9	2	1.9
	Universities	10	9.3	2	1.9
Media group	TVs	21	19.6	12	11
	Radios	12	11.2	7	6.8
	Magazines and journals	12	11.2	17	16.5
	Internet	1	0.9	0	0

*Total percentage did not become 100% because of multiple choice questions.

In West Java, the top five most frequently used information sources were: other farmers (78.5 percent), farmers' groups (37.4 percent), extension agents (30.8 percent), commercial companies/agricultural retail stores (21.5 percent), and TVs (19.6 percent), respectively. In Bali, the top five most frequently used information sources were: other farmers (88.3 percent), commercial companies/agricultural retail stores (74.8 percent), extension agents (43.7 percent), farmers' groups (30.1 percent), and magazines/journals (16.5 percent), respectively. Even though the rank of these information sources was different, four information sources were common in both West Java and Bali. This implies that other farmers, farmers' groups, extension agents and commercial companies/agricultural retail stores were significantly important information sources for vegetable farmers in West Java and Bali.

Awareness of Organic Vegetable Production Practices

The third research objective of this study was to ascertain farmers' awareness of target organic vegetable production practices. Table 20 provides the percentage for each item used to measure awareness of bio-pesticides and compost. The data were summated and categorized as "familiarity with bio-pesticides" and "familiarity with compost." The two categorical items were used for the binary logit analysis and path analysis (see binary logit analysis and path analysis parts in chapter 3). Respondents were asked their degree of familiarity with four statements on bio-pesticides and compost. Farmers' degree of familiarity with bio-pesticides and compost for each statement was measured on a 5-point Likert-type scale with 1= Very Familiar, 2= Familiar, 3= Somewhat Familiar, 4= Not Familiar, and 5= Not at all Familiar. Data were summarized in three groups, including familiar, somewhat familiar, and not familiar in Table 20. For this grouping, the 5-point Likert-type scale consisting of 1 and 2 were grouped into "Familiar," while the scales of 3 and 4 were grouped into "Not familiar."

Farmers' Awareness of Bio-pesticides

The item related to bio-pesticides includes four statements in the upper part of Table 20. In West Java, a majority of respondents knew the word "bio-pesticide" and how to use bio-pesticides. Sixty point seven (60.7) percent of respondents answered "familiar" to the statement "How familiar are you with the word bio-pesticide?" on a 5-point Likert-type scale, while 63.5 percent responded with "familiar" to the statement "How familiar are you with how bio-pesticides are used?" In addition, more than half of respondents knew the materials for making bio-pesticides and how to make bio-pesticides. Fifty five point one (55.1) percent of respondents answered "familiar" to the statement

“How familiar are you with the raw materials used to make bio-pesticides?” and 52.3 percent responded “familiar” to the statement “How familiar are you with how bio-pesticides are made?”

Table 20. Farmers' Awareness of the Target Organic Vegetable Production Practices in West Java and Bali

Item	West Java (N= 107)			Bali (N= 103)		
	Familiar	Somewhat Familiar	Not Familiar	Familiar	Somewhat Familiar	Not Familiar
	%	%	%	%	%	%
Bio-pesticide						
·How familiar are you with the word "bio-pesticides?"	60.7	3.7	35.5	20.4	26.2	53.4
·How familiar are you with raw materials used for making bio-pesticides?	55.1	3.7	41.1	12.6	10.7	76.7
·How familiar are you with how bio-pesticides are made?	52.3	0.9	46.7	11.7	4.9	83.5
·How familiar are you with how bio-pesticides are used?	63.5	0.9	35.5	33.9	10.7	55.3
Compost						
·How familiar are you with the word "compost/bokashi?"	83.2	0.9	15.9	66.0	7.8	26.2
·How familiar are you with raw materials used for making compost/bokashi?	85.0	0.9	14.0	61.2	8.7	30.1
·How familiar are you with making compost/bokashi?	81.3	1.9	16.8	51.5	11.7	36.9
·How familiar are you with using compost/bokashi?	85.1	0.9	14.0	72.8	11.7	15.6

In Bali, more than half of respondents did not know the word "bio-pesticides" or how to use them. Fifty three point four (53.4) percent answered "Not familiar" to the statement "How familiar are you with the word 'bio-pesticide'?" Fifty five point three (55.3) percent answered "Not familiar" to the statement "How familiar are you with how to use bio-pesticides?" Moreover, about 80 percent of respondents did not know the materials used for making bio-pesticides or how to make bio-pesticides. Seventy six point seven (76.7) percent of respondents answered "Not familiar" to the statement "How familiar are you with the raw materials used to make bio-pesticides?" and 83.5 percent responded "Not familiar" to the statement "How familiar are you with how to make bio-pesticides?"

Farmers' Awareness of Compost

The item related to compost includes four statements in the lower part of Table 20. In West Java, more than 80 percent of respondents knew the word "compost," the materials used for making compost, how to make compost, and the way to use compost. A majority (83.2 percent) responded "Familiar" to the statement "How familiar are you with the word 'compost/bokashi'?" and 85 percent responded "Familiar" to the statement "How familiar are you with raw materials used for making compost/bokashi?" Eighty one point 3 (81.3) percent answered "Familiar" to the statement "How familiar are you with how to make compost/bokashi?" and 85.1 percent answered "Familiar" to the statement "How familiar are you with how to use compost/bokashi?"

In Bali, a majority of respondents knew the word "compost," the materials used for making compost, and the ways to use compost. Sixty six (66) percent of respondents answered "Familiar" to the statement "How familiar are you with the word “compost/bokashi?” More than half (61.2 percent) responded “Familiar” to the statement “How familiar are you with the raw materials used for making compost/bokashi?” Seventy two point eight (72.8) percent responded “Familiar” to the statement “How familiar are you with how to use compost/bokashi?” Also, more than half of respondents knew the materials for making compost, as51.5 percent of respondents answered “Familiar” to the statement “How familiar are you with how compost/bokashi is made?”

In short, it could be said that respondents in West Java knew about bio-pesticides and compost; respondents in Bali did not know about bio-pesticides, but knew about compost.

Attitudes toward Organic Vegetable Production Practices

The forth research objective of this study was to ascertain farmers' attitudes toward target organic vegetable production practices. Table 21 provides the percentage for each item used to measure attitude toward bio-pesticide and compost. The data were summated and categorized as "relative advantage," "compatibility," "complexity," "trialability," and "observability." Respondents were asked to indicate their level of agreement with 12 attitudinal statements on target organic practices. Farmers' level of agreement with each statement was measured by a 5-point Likert-type scale with 1= Strongly Agree, 2= Agree, 3= Neutral, 4= Disagree, and 5= Strongly Disagree. The five categorical items were used for path analysis (see path analysis parts in chapter 3). In addition, data were summarized by three groups including agree, neutral, and disagree in Table 21. For this grouping, the 5-point Likert-type scales grouped 1 and 2 into the "Agree" category, while 3 and 4 were grouped into "Disagree."

Relative Advantage

Relative advantage is the degree to which an innovation is perceived as being better than the idea it supersedes. The degree of relative advantage is often expressed as economic profitability (Rogers, 1995). The items related to relative advantage include two statements in the Table 21.

In West Java, a majority of respondents thought that target organic practices reduced production costs. More than three-quarters (75.7 percent) of the respondents answered "Agree" to the statement "Using plant extracts to control insect pests can reduce production costs" on the 5-point Likert-type scale. A majority (78.5 percent) of respondents answered “Agree” to the statement “Using only organic fertilizer to grow vegetables can reduce production costs.”

In Bali, more than 80 percent of respondents thought that target organic practices reduce production costs. A majority (80.6 percent) of respondents answered “Agree” to the statement “Using plant extracts to control insect pests can reduce production costs.” Most respondents (84.5 percent) answered “Agree” to the statement “Using only organic fertilizer to grow vegetables can reduce production costs.”

Compatibility

Compatibility is the degree to which a new idea is perceived as consistent with the existing value, past experiences, and needs of potential adopters (Rogers, 1995). Farmers' level of agreement with each statement was measured with the 5-point Likert-type scale where 1= Strongly Agree, 2= Agree, 3= Neutral, 4= Disagree, and 5= Strongly Disagree. The items related to compatibility are four statements in the Table 21.

In West Java, a majority of respondents thought that use of target organic practices are a good fit with their culture and experience. More than half (65.4 percent) answered “Agree” to the statement “Using plant extracts to control insect pests is a good fit with my culture.” Sixty one point seven (61.7) percent answered “Agree” to the statement “Using plant extracts to control insect pests is a good fit with my experience.” More than three quarters of respondents (77.6 percent) answered “Agree” to the statement “Using only organic fertilizer to grow vegetables is a good fit with my culture.” A majority (79.4 percent) answered “Agree” to the statement “Using only organic fertilizer to grow vegetables is a good fit with my experience” (Table 21).

In Bali, a majority of respondents thought that the use of bio-pesticides is good fit with their culture; whereas less than half of respondents thought that the use of bio-pesticides is good fit their experience. More than half (69 percent) answered “Agree” to the statement “Using plant extracts to control insect pests is a good fit with my culture.”

Table 21. Farmers' Attitudes toward Target Organic Vegetable Production Practices in West Java and Bali

Item	West Java (N = 107)			Bali (N= 103)		
	Agree %	Neutral %	Disagree %	Agree %	Neutral %	Disagree %
Relative Advantage						
·Using plant extracts to control insect pests can reduce production costs.	75.7	5.6	18.7	80.6	4.9	14.6
·Using only organic fertilizer to grow vegetables can reduce production costs.	78.5	3.7	16.8	84.5	2.9	12.6
Compatibility						
·Using plant extracts to control insect pests is a good fit with my culture.	65.4	7.5	27.1	69.0	10.7	20.4
·Using plant extracts to control insect pests is a good fit with my experience.	61.7	14.0	24.3	49.5	24.3	26.2
·Using only organic fertilizer to grow vegetables is a good fit with my culture.	77.6	5.6	16.8	84.4	6.8	8.7
·Using only organic fertilizer to grow vegetables is a good fit with my experience.	79.4	4.7	15.9	71.9	13.6	14.6
Complexity						
·Using plant extracts to control pests is easy.	64.4	13.1	22.4	38.9	31.0	30.1
·Using only organic fertilizer to grow vegetables is easy.	89.7	0.9	9.3	74.8	10.7	14.6
Trialability						
·Plant extracts can be tested in a small part of my field to control insect pests.	83.2	1.9	15.0	77.6	9.7	12.7
·Organic fertilizer can be tested in a small part of my field to grow vegetables.	90.7	0.9	8.4	87.4	7.8	4.9
Observability						
·People can easily see a difference between vegetables grown using plant extracts and vegetables grown using inorganic insecticide to control insect pests.	85.9	1.9	12.1	74.7	12.6	12.6
·People can see easily a difference between vegetables grown using only organic fertilizer and vegetables grown using inorganic fertilizer.	88.8	0	11.2	84.5	7.8	7.8

Almost half (49.5 percent) of respondents answered "Agree" to the statement "Using plant extracts to control insect pests is a good fit with my experience." In addition, a majority of the respondents thought that the use of compost is good fit with their culture and experience. A majority (84.4 percent) of respondents answered "Agree" to the statement "Using only organic fertilizer to grow vegetables is a good fit with my culture." Almost three quarters (71.9 percent) of respondents answered "Agree" to the statement "Using only organic fertilizer to grow vegetables is a good fit with my experience" (Table 21).

Complexity

Complexity is the degree to which a new idea is perceived as relatively difficult to understand and use (Rogers, 1995). Farmers' level of agreement about complexity was measured with ratings on two statements: 1) using plant extracts to avoid pests is easy; 2) using only organic fertilizer to grow vegetables is easy.

Findings in Table 21 show that a majority of respondents thought that use of target organic practices was not difficult in West Java. More than half (64.4 percent) of respondents answered "Agree" to the statement "Using plant extracts to control pests is easy." Almost nine out of ten (89.7 percent) respondents answered "Agree" to the statement "Using only organic fertilizer to grow vegetables is easy."

In Bali, a majority of respondents thought that the use of bio-pesticides is not easy. Only about 40 percent of the respondents (38.9 percent) answered "Agree" to the statement "Using plant extracts to control pests is easy." However, regarding compost, majority of respondents thought that the use of compost is easy. Almost three out of four

(74.8 percent) of respondents answered "Agree" to the statement "Using only organic fertilizer to grow vegetables is easy" (Table 21).

Trialability

Trialability is the degree to which a new idea may be experimented with on a limited basis. Innovations that can be tried on the installment plan are generally adopted more rapidly than ones that are not divisible (Rogers, 1995). Two statements dealt with the trialability of organic vegetable production practices in table 21.

In West Java, more than 80 percent of respondents thought that they could try the target organic practices using a small plot. A majority (83.2 percent) of respondents answered "Agree" to the statement "Plant extracts can be tested in a small part of my field." Most (90.7 percent) respondents answered "Agree" to the statement "Organic fertilizer can be tested in a small part of my field to grow vegetables."

In Bali, a majority of respondents thought that they could try target organic practices using a small plot. More than three out of four (77.6 percent) of respondents answered "Agree" to the statement "Plant extracts can be tested in a small part of my field to control insect pests." Similarly, more than four out of five (87.4 percent) of respondents answered "Agree" to the statement "Organic fertilizers can be tested in a small part of my field to grow vegetables" (Table 21).

Observability

Observability is the degree to which the results of a new idea are visible to others (Rogers, 1995). Farmers' level of agreement about observability was measured using two statements.

Observability is the degree to which the results of a new idea are visible to others (Rogers, 1995). Farmers' level of agreement about observability was measured using two statements.

Findings in Table 21 show that more than 80 percent of respondents thought that they could distinguish between conventional vegetables and organic vegetables in West Java by looking at the vegetables. Most (85.9 percent) respondents answered "Agree" to the statement "People can easily see a difference between vegetables grown using plant extracts and vegetables grown using inorganic insecticides to control insect pests." The majority (88.8 percent) of respondents answered "Agree" to the statement "People can easily see a difference between vegetables grown using only organic fertilizer and vegetables grown using inorganic fertilizer."

In Bali, a majority of respondents thought that they could distinguish between conventional vegetables and organic vegetables. Almost three quarters (74.7 percent) of respondents answered "Agree" to the statement "People can easily see a difference between vegetables grown using plant extracts and vegetables grown using inorganic insecticides to control insect pests." Most (84.5 percent) respondents answered "Agree" to the statement "People can easily see a difference between vegetables grown using only organic fertilizer and vegetables grown using inorganic fertilizer" (Table 21).

In summary, respondents in West Java had positive attitudes toward use of bio-pesticides and compost. Respondents in Bali had positive attitudes toward use of compost, but they had somewhat negative attitudes toward the use of bio-pesticides in terms of compatibility and complexity.

Adoption of Organic Vegetable Production Practices

The fifth research objective of this study was to find out if farmers in the area have adopted organic vegetable production practices or intend to adopt these practices in the near future. The data of intention to adopt the target organic practices were summated and categorized as "intention to adopt bio-pesticides" and "intention to adopt compost." The results on intention to adoption are discussed after adoption rates of the target organic practices. Adopting one practice is only one step in going organic.

Adoption Rate of the Target Organic Practices

Findings on the adoption rate of bio-pesticides and compost in West Java and Bali are presented in table 22. In West Java, adoption rates of bio-pesticides in cabbage, tomato, and carrot productions were 9.3 percent, 9.3 percent, and 13.1 percent, respectively. Also, adoption rates of compost use in cabbage, tomato, and carrot production were 5.6 percent, 7.5 percent, 11.2 percent, respectively.

In Bali, adoption rates of bio-pesticides in cabbage, tomato, and carrot productions were all 2.9 percent. Moreover, adoption rates of compost use in cabbage, tomato, and carrot productions were 1.9 percent, 2.9 percent, and 9.7 percent, respectively.

Table 22. Farmers who have Adopted/not Adopted Organic Vegetable Production Practices in West Java and Bali

	Vegetables	West Java (N= 107) Adopted %	West Java (N= 107) Not adopted %	Bali (N= 103) Adopted %	Bali (N= 103) Not adopted %
Application of bio-pesticides (plant extracts)	Cabbage	9.3	90.7	2.9	97.1
	Tomato	9.3	90.7	2.9	97.1
	Carrot	13.1	86.9	2.9	97.1
Use of compost	Cabbage	5.6	94.4	1.9	98.1
	Tomato	7.5	92.5	2.9	9.1
	Carrot	11.2	88.8	9.7	90.3

Reasons why Respondents did not Adopt Target Organic Vegetable Production Practices

Application of Bio-Pesticides

Table 23 shows the reasons why respondents did not adopt bio-pesticides in West Java and Bali.

Table 23. The Reasons why Vegetable Farmers did not Adopt Bio-pesticides in West Java and Bali

Reasons	West Java (N=69) Frequency	Bali (N=99) Frequency
I cannot make bio-pesticides	11	16
I don't know how to make bio-pesticides	0	30
It is difficult to make bio-pesticides	1	0
It takes long time to make bio-pesticides	3	0
I don't know the raw materials needed to make bio-pesticides	1	0
It is difficult to find raw materials to make bio-pesticides	17	2
I don't have enough time to find raw materials to make bio-pesticides	2	0
I don't know about bio-pesticides	0	1
I haven't used bio-pesticides	3	6
I cannot trust bio-pesticides	1	1
I cannot buy bio-pesticides in an agricultural store in the village	0	1
Using pesticide is easy to kill pests	11	10
Pesticides must be used to grow vegetables in rainy seasons in the village	0	1
Using bio-pesticides may reduce vegetable production	4	1
Using bio-pesticides may take longer than pesticides to kill pests	1	0
Bio-pesticide may not kill pests easily	11	16
I am not happy about using bio-pesticides	0	1
Using bio-pesticides is not good fit for me	1	0
Many farmers still use pesticides	1	6

In West Java, various reasons were given, including:

"I cannot make bio-pesticides."
"It is difficult to find raw materials to make bio-pesticide."
"Using pesticides is easy to kill pests" and,
"Bio-pesticides may not be able to kill pests easily."
Similarly in Bali, numerous reasons were given, including:

"I cannot make bio-pesticides,"
"I don't know how to make bio-pesticides,"

"Using pesticides makes it easy to kill pests" and,
"Bio-pesticides may not kill pests easily."

In general, both regions had similar reasons for not adopting bio-pesticides.

In Bali, the most frequently mentioned reason was "I don't know how to make bio-pesticides;" while the most frequently mentioned response in West Java was "it is difficult to find raw materials to make bio-pesticides."

Use of Compost

Table 24 showed the reasons why respondents did not adopt compost in West Java and Bali. In West Java, various reasons were mentioned. These included:

"Using only compost may take longer than chemical fertilizers to harvest vegetables,"
"Using only compost may not grow vegetables well" and,
"It takes a long time to make compost."

Similarly in Bali, several reasons were given by the respondents. These included:

"Using only compost takes more time than chemical fertilizers to harvest vegetables" and,
"Using only compost may not grow vegetables well."

Both regions had similar reasons why farmers did not adopt compost. In short, respondents wanted to use a fertilizer because it is easy to use and fast-acting. Key indications are that if bio-pesticides are readily available, they will use them.

Table 24. The Reasons Why Vegetable Farmers did not Adopt Compost in West Java and Bali

Reasons	West Java (N=71) Frequency	Bali (N=100) Frequency
I don't know how to make compost	4	0
It is difficult to make compost	4	0
It is difficult to find raw materials to make compost	2	1
It takes a long time to make compost	6	1
Making compost is very hard work	1	0
I don't have time to make compost	1	0
I always use chemical fertilizer	3	2
For carrot production, it is not necessary to use both chemical fertilizer and compost	2	0
Chemical fertilizer is better than compost	1	0
Using chemical fertilizers is easy and I can buy them at an agricultural store	2	3
Both chemical fertilizer and compost must be used for vegetable production	1	0
It is difficult to grow vegetables without chemical fertilizers because of the weather	0	1
Using only compost may reduce vegetable production	4	4
Using only compost may take longer than chemical fertilizer to harvest vegetables	27	40
Using only compost is not a good fit for vegetable production	2	0
Using only compost may not grow vegetables well	8	43
Soil conditions require chemical fertilizers	0	1
I don't need to use compost because the quality of soil on the farm is good	1	0
Using only compost may reduce soil fertility/nutrition	0	2
It is difficult to change all my farms to organic at the same time	1	0
No extension agents teach nothing about compost	0	1

Intention to Adopt Bio-pesticides

First, respondents were asked if they have adopted organic vegetable production practices, which included the use of plant extracts and compost. Those who answered "No" were asked to indicate their degree of likeliness to adopt organic practices. Farmers' degree of intention to adopt organic practices with each statement was measured by a 5-point Likert-type scale with 1= I will likely convert, 2= I may convert, 3= I am not sure, 4= I may not convert, and 5= I will likely not convert. The items related to the intention to adopt bio-pesticides include: 1) I intend to adopt plant extracts in my cabbage production; 2) I intend to adopt plant extracts in my tomato production; 3) I intend to adopt the use of plant extracts for my carrot production in Table 25. Data were summarized by three groups including convert, not sure, and not convert in Table 25. For this grouping, the 5-point Likert-type scales 1 and 2 were grouped into "Convert" and the 3 and 4 were grouped into "Not convert."

In West Java, more than half of respondents who did not use bio-pesticides for their vegetable production intended to adopt bio-pesticides in the future. More than half (53.6 percent) of respondents answered "Convert" to the statement "I intend to adopt the use of plant extracts for my cabbage production." Similarly, 53.6 percent of respondents answered "Convert" to the statement "I intend to adopt the use of plant extracts for my tomato production." About half (51.1 percent) of respondents answered "Convert" to the statement "I intend to adopt the use of plant extracts for my carrot production."

In Bali, more than half of those who did not use bio-pesticides for their vegetable production intended to adopt bio-pesticides in the future; however, a third of respondents were not sure whether or not to adopt them. Sixty percent of respondents answered "Convert" to the statements "I intend to adopt the use of plant extracts for my cabbage production," "I intend to adopt the use of plant extracts for my tomato production," and "I intend to adopt the use of plant extracts for my carrot production." However, 33 percent of respondents answered "I am not sure" to the same three statements.

Table 25. Farmers Who Intend to Adopt Organic Vegetable Practices in the Near Future in West Java and Bali

Item	West Java (n = 107)				Bali (n = 103)			
	N	Convert	Not Sure	Not convert	N	Convert	Not Sure	Not convert
		%	%	%		%	%	%
Bio-pesticide								
·I intend to adopt the use of plant extracts for cabbage production.	97	53.6	27.8	18.5	100	60.0	33.0	7.0
·I intend to adopt the use of plant extracts for tomato production.	97	53.6	27.8	18.5	100	60.0	33.0	7.0
·I intend to adopt the use of plant extracts for carrot production.	94	51.1	28.7	20.2	100	60.0	33.0	7.0
Compost								
·I intend to adopt the use of only organic fertilizer for cabbage production.	100	59.0	23.0	16.8	101	52.5	18.8	28.7
·I intend to adopt the use of only organic fertilizer for tomato production.	99	56.5	23.2	19.2	100	53.0	19.0	28.0
·I intend to adopt the use of only organic fertilizer for carrot production.	96	58.3	22.9	18.8	95	51.6	18.9	29.5

Intention to Adopt Compost

Farmers' degree of intention to adopt organic practices with each statement was measured by a 5-point Likert-type scale with 1= I will likely convert, 2= I may convert, 3= I am not sure, 4= I may not convert, and 5= I will likely not convert. The items related to intention to adopt compost included the following: 1) I intend to adopt the use of only organic fertilizer for cabbage production; 2) I intend to adopt the use of only organic fertilizer for tomato production; 3) I intend to adopt the use of only organic fertilizer for carrot production.

As shown in table 25, in West Java more than half of the respondents who did not use compost only for their vegetable production intended to adopt the use of compost only in the future. A little more than half (59 percent) answered "Convert" to the statement "I intend to adopt the use of organic fertilizer only for cabbage production." More than half (56.5 percent) answered "Convert" to the statement "I intend to adopt the use of organic fertilizer only for tomato production." Also, 58.3 percent of respondents answered "Convert" to the statement "I intend to adopt the use of organic fertilizer only for carrot production."

In Bali, more than half the respondents who did not use compost only for their vegetable production intended to adopt the use of compost only in the future. About half (52.5 percent) answered "Convert" to the statement "I intend to adopt the use of organic fertilizer only for cabbage production." Similarly, 53 percent answered "Convert" to the statement "I intend to adopt the use of organic fertilizer only for tomato production." About half (51.6 percent) said "convert" to the statement "I intend to adopt the use of organic fertilizer only for carrot production."

In short, adoption rates of bio-pesticides in cabbage and tomato production were less than 10 percent for both West Java and Bali. Adoption rates for compost in cabbage and tomato production were also less than 10 percent in both sites. For carrot production, around 12 percent of respondents use bio-pesticides and compost in both sites. Thus, about 90 percent of respondents in West Java and Bali did not practice target organic methods. However, more than half of respondents in the both sites intended to adopt them in the future.

Reasons Why Respondents Will Not Adopt Bio-pesticide and Compost

Respondents those who answered "I may not convert" and "I will likely not convert" were asked the reasons why they would not adopt bio-pesticides and compost use. Sixty eight respondents were asked the questions.

The main reasons farmers would not adopt bio-pesticides in both West Java and Bali were:

"Using bio-pesticides may reduce vegetable production because it cannot kill pests easily" (11 respondents) and,

"I don't know how to make bio-pesticides" (5 respondents)

Main reasons farmers would not adopt compost in West Java include:

"I want to harvest vegetables quickly" (7 respondents),

"Using only compost may not grow vegetables well" (3 respondents)

"Using only compost may reduce vegetable production" (3 respondents) and,

"It is difficult to make compost" (2 respondents).

In Bali, two main reasons farmers would not adopt compost were:

"Using only compost may not grow vegetables well" (15 respondents) and, "Using only compost may take longer than chemical fertilizers to grow vegetables" (10 respondents).

Relationship between Socio-Economic Characteristics and Familiarity with Organic Vegetable Production Practices

The sixth research objective of this study was to determine the factors associated with awareness of organic practices. The study hypothesized that a respondent's location, gender, age, education level, household size, number of family laborers, farming experience, farm size, distance to the pilot farm, irrigation sources, land tenure status, net revenue of cabbage, tomato, carrot production; exposure to the pilot farm and any information source groups (media, extension, farmer and commercial group) may affect the familiarity with bio-pesticides and compost.

To test the hypothesis, binary logit analysis was used. SPSS was used to analyze the logit model. Table 26 presents comparison of the explanatory variables between familiarity and non familiarity with bio-pesticides. Significant differences ($p<0.05$) in means of the variables were observed between familiarity with and non-familiarity with bio-pesticides. The explanatory variables of this analysis were: location of respondent (LOCA), gender of respondent (GEN), age of respondent (AGE), five dummies for education level (EDU), household size of respondent (HS), size (number) of the farming labor force in a household (FL), farming experience of the respondent (EXPERIENCE), area of the farm (FARM), distance from respondent's house to the pilot farm (DIS), irrigation dummy (DIRR), land tenure dummy (DLAND), net revenue of cabbage production (CNETREV), net revenue of tomato production (TNETREV), net revenue of carrot production (WNETREV), exposure to the pilot farms (EXPO), media information source group (IFG_MEDIA), extension information source group (IFG_EXTEN), farmer information source group (IFG_FARMER), and commercial company/agricultural retail store (IFG_COMMER).

Table 26. Comparison of Variables between Familiarity and Non-Familiarity with Bio-Pesticides

	Mean (SD)		
Variables	Familiar (N=89)	Not familiar (N=121)	t-value
LOCA	0.74 (0.4)	0.34 (0.5)	6.259*
GEN	1.00 (0.0)	0.91 (0.3)	2.969*
AGE	41.09 (11.0)	41.36 (12.7)	-0.166
EDU2 [a]	0.33	0.27	
EDU3 [a]	0.42	0.38	
EDU4 [a]	0.11	0.14	
EDU5 [a]	0.07	0.07	
HS	4.47 (1.6)	4.00 (1.5)	2.159*
FL	1.82 (0.7)	2.08 (0.7)	-2.820*
EXPERIENCE	15.56 (9.6)	19.16 (11.0)	-2.518*
FARM	63.41 (97.1)	56.21 (45.9)	0.649
DIS	0.91 (0.7)	1.48 (0.9)	-4.897*
DIRR	0.80 (0.4)	0.92 (0.3)	-2.483*
DLAND	0.49 (0.5)	0.71 (0.5)	-3.200*
CNETREV	1,233 (4,982)	1,486 (5,997)	-0.333
TNETREV	2,034 (9,103)	141 (6,526)	1.755
WNETREV	1,413 (5,047)	1,642 (3,649)	-0.363
EXPO	1.46 (1.7)	0.23 (0.7)	7.124*
IFG_MEDIA	0.55 (0.8)	027 (0.7)	2.641*
IFG_EXTEN	0.58 (0.7)	0.35 (0.5)	2.755*
IFG_FARMER	1.53 (0.8)	1.21 (0.6)	3.424*
IFG_COMMER	0.52 (0.5)	0.64 (0.6)	-1.450

Note: * indicate statistical significant at $P<0.05$.

[a] EDU1, with frequency 210 (familiar mean = 0.13, not familiar mean = 0.08), was captured in the constant and thus omitted to facilitate its comparison with other educational levels.

Regarding familiarity with bio-pesticides, variables showing significant differences ($P<0.05$) in familiarity (familiar and not familiar) were: location of respondent (LOCA), gender of respondent (GEN), household size of respondent (HS), size (number) of the farming labor force in a household (FL), farming experience of respondent (EXPERIENCE), distance from respondent's house to the pilot farm (DIS), irrigation dummy (DIRR), land tenure dummy (DLAND), exposure to the pilot farms (EXPO), media information source group (IFG_MEDIA), extension information source group (IFG_EXTEN), and farmer information source group (IFG_FARMER).

Characteristics of the respondents who tended to know more about bio-pesticides were: lived in West Java, male, no irrigation, have unsecure land status, larger household, have fewer numbers in the farming labor force in a household, have less farming experience, live close to the pilot farm, know more about the DNBAF project, have more information sources from the media, use information from extension, and have more interaction with the farmer information group.

Table 27 does the same comparison between familiarity and non-familiarity with compost. Significant differences ($p<0.05$) in means of the variables were observed between familiarity with and non-familiarity with compost. The explanatory variables were: location of respondent (LOCA), gender of respondent (GEN), age of respondent (AGE), five dummies for education level (EDU), household size of respondent (HS), size (number) of the farming labor force in a household (FL), farming experience of respondent (EXPERIENCE), area of the farm (FARM), distance from respondent's house to the pilot farm (DIS), irrigation dummy (DIRR), land tenure dummy (DLAND), net revenue of cabbage production (CNETREV), net revenue of tomato production (TNETREV), net revenue of carrot production (WNETREV), exposure to the pilot farms (EXPO), media information source group (IFG_MEDIA), extension information source group (IFG_EXTEN), farmer information source group (IFG_FARMER), and commercial company/agricultural retail store (IFG_COMMER).

Table 27. Comparison of Variables between Familiarity and Non-Familiarity with Compost

	Mean (SD)		
Variables	Familiar (N=130)	Not familiar (N=80)	t-value
LOCA	0.61 (0.5)	0.35 (0.5)	3.748*
GEN	0.98 (0.5)	0.89 (0.3)	3.124*
AGE	41.63 (12.2)	40.63 (11.7)	0.594
EDU2[a]	0.28	0.31	
EDU3[a]	0.36	0.45	
EDU4[a]	0.13	0.13	
EDU5[a]	0.10	0.03	
HS	4.35 (1.6)	3.96 (1.5)	1.758
FL	1.91 (0.6)	2.08 (0.7)	-1.679
EXPERIENCE	16.59 (10.1)	19.33 (11.1)	-1.793
FARM	64.30 (84.2)	51.08 (45.2)	1.476
DIS	1.12 (0.9)	1.41 (0.9)	-2.311*
DIRR	0.85 (0.40)	0.90 (0.3)	-0.995
DLAND	0.59 (0.5)	0.68 (0.5)	-1.230
CNETREV	961 (4,667)	2,058 (6,783)	-1.273
TNETREV	973 (7,093)	894 (8,784)	0.068
WNETREV	1,593 (4,796)	1,467 (3,328)	0.226
EXPO	1.09 (1.6)	0.20 (0.7)	4.802*
IFG_MEDIA	0.50 (0.8)	021 (0.6)	2.687*
IFG_EXTEN	0.55 (0.7)	0.28 (0.4)	3.203*
IFG_FARMER	1.44 (0.8)	1.19 (0.5)	2.597*
IFG_COMMER	0.60 (0.6)	0.56 (0.6)	0.433

Note: * indicate statistical significant at $P<0.05$.

[a] EDU1, with frequency 210 (familiar mean = 0.12, not familiar mean = 0.09), was captured in the constant and thus omitted to facilitate its comparison with other educational levels.

Familiarity with compost variables showing significant differences ($P<0.05$) in familiarity dependent variables (familiar and not familiar) were: location of respondent

(LOCA), gender of respondent (GEN), distance from respondent's house to the pilot farm (DIS), exposure to the pilot farms (EXPO), media information source group (IFG_MEDIA), extension information source group (IFG_EXTEN), and farmer information source group (IFG_FARMER).

Characteristics of the respondents who tended to know more about compost were: live in West Java, male, live close to the pilot farm, know more about the DNBAF project, have more information sources from the media, have more information sources from extension, and have more interaction with the farmer information group.

The coefficients, their standard errors, significance levels and odd ratio for bio-pesticides are listed in Table 28. The likelihood ratio test suggests the estimated model had a good fit with a statistically significant score of 192.15 at the 1 percent level. The McFadden R^2, a pseudo R-square, was 0.294, which falls in the range 0.2 to 0.4 that is considered an "extremely good fit" (Hensher and Johnson, 1981). Prediction success statistics indicated that the model correctly predicted about 76.6 percent of the responses.

The results of Table 28 identified no significant influences of any variables except exposure to the pilot farm (EXPO), educational level equaling completed primary school (EDU3), educational level equaling completed junior high school (EDU4) and distance from respondent's house to the pilot farm (DIS) for the probability of familiarity with bio-pesticides.

Exposure to the pilot farm (EXPO) had a significant positive effect at the 1 percent level in the model, indicating that vegetable farmers who knew about the pilot farm had higher probabilities of being familiar with bio-pesticides than farmers who did not know about the pilot farm. In addition, the positive coefficients of the educational level of completed primary school (EDU3) and the educational level of completed junior high school (EDU4) were significantly different from zero at the 5 percent level. The odd ratio of DEU3 indicated that farmers who had completed primary school had about six times higher probability of being familiar with bio-pesticides, compared to the farmers who never went to school. Also, the odd ratio of DEU4 indicated that farmers who had completed junior high school had about eleven times higher probability of being familiar with bio-pesticides, compared to the farmers who never went to school.

Tables 28. Estimated Coefficients of the Binary Logit Model for Familiarity of Bio-Pesticide

Variables	B	S.E.	Wald	Sig.	Exp(B)
LOCA	1.204	0.733	2.697	0.101	3.332
GEN	20.194	11838.243	0.000	0.999	589042554.824
AGE	0.005	0.021	0.054	0.816	1.005
EDU2	1.239	0.759	2.666	0.103	3.453
EDU3**	1.729	0.872	3.930	0.047	5.637
EDU4**	2.392	1.087	4.846	0.028	10.938
EDU5	1.495	1.209	1.531	0.216	4.461
HS	0.167	0.146	1.301	0.254	1.182
FL	-0.111	0.310	0.128	0.720	0.895
EXPERIENCE	0.009	0.023	0.163	0.686	1.009
FARM	0.001	0.003	0.244	0.621	1.001
DIS*	-0.433	0.253	2.938	0.087	0.648
DIRR	-0.660	0.574	1.322	0.250	0.517
DLAND	-0.210	0.488	0.186	0.667	0.810
CNETREV	0.000	0.000	0.332	0.564	1.000
TNETREV	0.000	0.000	0.127	0.722	1.000
WNETREV	0.000	0.000	0.918	0.338	1.000
EXPO***	0.551	0.183	9.026	0.003	1.734
IFG_MEDIA	-0.029	0.267	0.011	0.915	0.972
IFG_EXTEN	0.003	0.403	0.000	0.993	1.003
IFG_FARMER	0.191	0.333	0.328	0.567	1.210
IFG_COMMER	0.244	0.386	0.400	0.527	1.277
Constant	-23.155	11838.243	0.000	0.998	0.000

Note: Likelihood ratio test: $\chi^2 = 192.152$ (d.f. = 22); critical $\chi^2 = 33.92$; $p > \chi^2$: < 0.0001. McFadden R^2 = 0.294. The percent correct classification is 76.6 %. Number of observations = 210. ***, ** and * indicate statistical significant $P<0.001$, $P<0.005$, and $P<0.10$, respectively. EDU variables compare familiarity with bio-pesticides relative to vegetable farmers with an educational level of no school (EDU1). A positive sign on any of the educational dummies would mean that farmers in that particular educational category had a higher probability of being familiar with bio-pesticides than farmers with an educational level of no school.

Moreover, the negative coefficient of distance from respondent's house to the pilot farm (DIS) was significantly different from zero at the 10 percent level. This was interpreted to indicate that farmers who lived closer to the pilot farm had a higher probability of being familiar with bio-pesticides rather than those who lived far from the pilot farm.

Table 29 shows the coefficients, their standard errors, significance levels and odd ratio for compost. The likelihood ratio test suggests the estimated model had a good fit with a statistically significant score of 209.116 at the 1 percent level. The McFadden R^2, a pseudo R-square, was 0.218, which falls in the range 0.2 to 0.4 that is considered an "extremely good fit" (Hensher and Johnson, 1981). Prediction success statistics indicated that the model correctly predicted 72.6 percent of the responses.

The results of Table 29 identified no significant influences of any variables except exposure to the pilot farm (EXPO), location of respondent (LOCA), gender of respondent (GEN), net revenue of cabbage production (CNETREV), total number of "information source" checks for the commercial information source group (IFG_COMMER), and the constant on the probability of being familiar with compost.

Exposure to the pilot farm (EXPO) had a significant positive effect at the 5 percent level in the model, indicating that vegetable farmers who were exposed to the pilot farm had higher probabilities of being familiar with compost than farmers who were not exposed to the pilot farm. In addition, the positive coefficients of the location of respondent (LOCA) and gender of respondent (GEN) were significantly different from zero at the 10 percent level. According to the odd ratio of LOCA, farmers in West Java had about a four times higher probability of being familiar with compost than farmers in Bali. According to the odd ratio of GEN, male farmers had about a six times higher probability of being familiar with compost than female farmers. Moreover, the positive coefficient of net revenue of cabbage production (CNETREV) was significantly different from zero at the 10 percent level. However, the coefficients of CNETREV were zero because their frequencies were small; thus there was no influence on the familiarity with compost.

Table 29. Estimated Coefficients of the Binary Logit Model for Familiarity of Compost

Variables	B	S.E.	Wald	Sig.	Exp(B)
LOCA*	1.329	0.710	3.509	0.061	3.779
GEN*	1.730	0.898	3.716	0.054	5.643
AGE	0.013	0.020	0.399	0.527	1.013
EDU2	-0.317	0.664	0.228	0.633	0.728
EDU3	-0.263	0.731	0.129	0.719	0.769
EDU4	0.853	0.920	0.860	0.354	2.347
EDU5	1.598	1.197	1.782	0.182	4.944
HS	0.010	0.143	0.005	0.946	1.010
FL	0.090	0.284	0.100	0.752	1.094
EXPERIENCE	-0.016	0.021	0.552	0.457	0.984
FARM	0.001	0.003	0.043	0.836	1.001
DIS	-0.029	0.224	0.016	0.899	0.972
DIRR	-0.316	0.584	0.293	0.588	0.729
DLAND	0.213	0.482	0.195	0.659	1.237
CNETREV*	0.000	0.000	3.514	0.061	1.000
TNETREV	0.000	0.000	0.843	0.359	1.000
WNETREV	0.000	0.000	2.604	0.107	1.000
EXPO**	0.464	0.216	4.616	0.032	1.591
IFG_MEDIA	0.163	0.284	0.332	0.564	1.178
IFG_EXTEN	0.430	0.411	1.092	0.296	1.537
IFG_FARMER	0.143	0.340	0.178	0.673	1.154
IFG_COMMER*	0.644	0.359	3.206	0.073	1.903
Constant*	-3.113	1.640	3.603	0.058	0.044

Note: Likelihood ratio test: $\chi^2 = 209.116$ (d.f. = 22); critical $\chi^2 = 33.92$; $p > \chi^2$: < 0.0001. McFadden $R^2 = 0.218$.

The percent correct classification is 72.6 %. Number of observations = 210. ***, ** and * indicate statistical significant
P<0.001, *P*<0.005, and *P*<0.10, respectively. EDU variables compare familiarity with bio-pesticides relative to vegetable farmers with an educational level of no school (EDU1). A positive sign on any of the educational dummies would mean that farmers in that particular educational category had a higher probability of being familiar with compost than farmers with an educational level of no school.

The positive coefficient of total number of "information source" checks for commercial information source group (IFG_COMMER) was significantly different from zero at the 10 percent level. This was interpreted to indicate that farmers who obtained information for their vegetable production from market people and commercial company/agricultural retail stores (commercial information group) had higher probability of being familiar with compost than those who did not obtain information from the commercial information group. Finally, the negative coefficient of constant was significantly different from zero at the 10 percent level, but this interpretation of the intercept might not have any real meaning (Gujarati, 1995).

In short, it could be said that the factors associated with awareness of target organic vegetable production practices, including bio-pesticides and compost in the study sites would be: location (LOCA), gender (GEN), educational level (EDU) distance to the pilot farms (DIS), exposure to the pilot farm (EXSPO), and information sources in the conceptual framework (Figure 10).

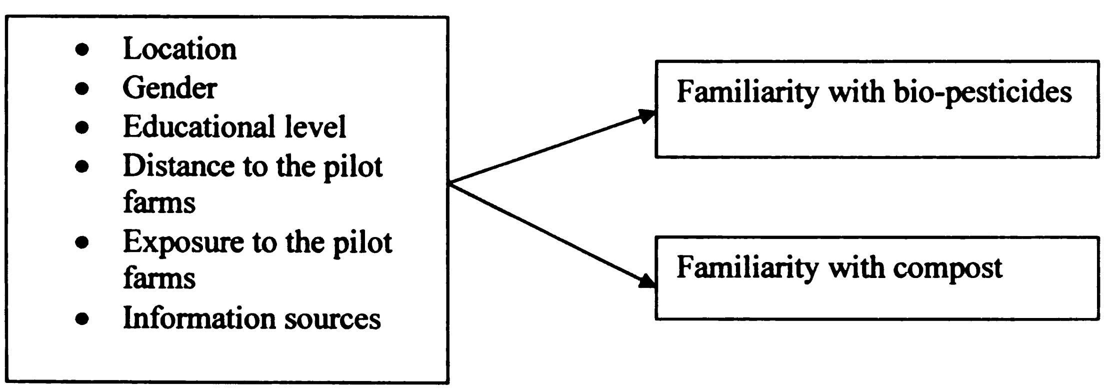


Figure 10. Factors Associated with Awareness of the Target Organic Vegetable Production Practices

Relationship Between Familiarity With, Attitude Toward, and Intension to Adopt Organic Vegetable Production Practices

The seventh research objective of this study was to demonstrate the impact of awareness and attitudinal characteristics of vegetable farmers on the decision to adopt organic practices. The study hypothesis is that farmers' familiarity with target organic vegetable practices may affect farmers' attitude toward the target organic methods, and it may be possible to increase the chance that the farmer will adopt organic farming by changing attitudes toward target organic methods.

To test the study hypothesis, path analysis was used. Table 30 shows descriptive statistics and correlations. From the conceptual framework of this study (Figure 7 in Chapter 2), the conceptual model was tested to see if the data support the model. A structural equation modeling program Amos 18 was used for this analysis.

Table 30. Descriptive Statistics for the Familiarity-Attitude-Intention to Adopt Model

				Correlations			
	Variables	Mean	SD	1	2	3	4
1	Familiarity of bio-pesticides	12.46	3.56				
2	Familiarity of compost	9.66	3.04	0.537*			
3	Attitude toward target organic vegetable practices	27.96	5.41	0.375*	0.330*		
4	Intention to adopt bio-pesticides	8.31	3.71	-0.134	-0.084	0.125	
5	Intention to adopt compost	9.03	4.21	0.152*	0.080	0.142*	0.436*

Notes: N=210

*Correlations are significant at $p < 0.05$.

Table 31. Coefficients and t-value for the Causal Paths of the Familiarity-Attitude-Intention to Adopt Model

Dependent variable	Independent variable	Standardized coefficient	p-value
Attitude toward target organic vegetable production practices	Familiarity with bio-pesticides	0.28*	0.00
	Familiarity with compost	0.18*	0.02
Intention to adopt bio-pesticides	Attitude toward target organic vegetable production practices	0.13*	0.07
Intention to adopt compost	Attitude toward target organic vegetable production practices	0.14**	0.04
Chi-square	Chi-square = 60.6 Degree of freedom = 5 Probability level = 0.000		
Root Mean Square Error of Approximation (SMREA)	0.23 (recommended value: <0.05)		
Goodness of fit index (GFI)	0.91(recommended value: >0.90)		
Comparative fit index (CFI)	0.67(recommended value: >0.90)		

* and ** = Significant at $p<0.05$ and $p<0.10$, respectively.

Shown in Table 31, the model did not fit well statistically, χ^2 (5, N=210) = 60.6, p = 0.000. Table 33 shows standardized path confidents for the model and the fit indexes indicating a less than good fit of the model to the data: root mean square error of approximation (SMREA) = 0.23, goodness of fit index (GFI) = 0.91 and comparative fit index (CFI) = 0.67 (Honda, 2007; Toyota, 1998). Therefore the model did not support the data.

Figure 11 shows the diagram to indicate the relationships among familiarity with target organic vegetable production practices, attitudes toward target organic vegetable production practices, and intention to adopt target organic vegetable production practices in the conceptual framework.

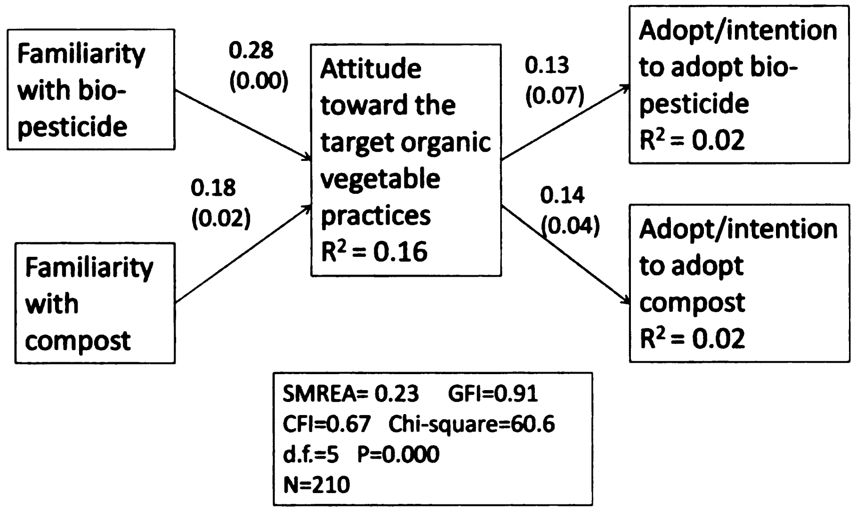


Figure 11. Relationships among Familiarity With, Attitudes Toward, and Intention to Adopt Target Organic Vegetable Production Practices

Possible Reasons why the Data did not Support the Study Hypothesis

There are several possible reasons why the data did not support the study hypothesis.

The first possible reason is that target organic vegetable production practices as an innovation had not been disseminated widely by the BNBAF project. The BNBAF project set pilot farms to demonstrate target organic vegetable production practices, including bio-pesticides and compost in West Java and Bali in January of 2005. As far as timing of conducting fieldwork in 2007, the BNBAF project had workshops to disseminate information on two organic practices to the vegetable farmers in July 2007 in West Java and in September 2007 in Bali. However, though the BNBAF project had conducted several informational activities for more than two years, approximately one-third of respondents in West Java and less than 10 percent of respondents in Bali recognized the pilot farms (see Table 18). Therefore, it might be possible that the BNBAF project activities had not reached the perceptions and decision stages in the adoption/diffusion model.

The second possible reason is small sample size. According to MacCallum and Austin (2000), the statistical properties of the various estimators are dependent on large samples (N>1000). However, this is not common in most existing communication research (Holbert and Stephenson, 2002). Holbert and Stephenson (2002) recommended "at least a sample of 100, but encourage 200 for simple mediating models with moderately reliable measures" (p. 536.) to analyze a structural equation model, including path analysis in communication research. Tanaka (1987) suggested that more complex models require larger samples for stable estimates. The study sample size was 210. It looked like a reasonable sample size for the conceptual model (see Figure 11). However, if the true model was more complex model than the conceptual model and it had more than four hypothetical paths described arrows in the model, a sample size larger than 210 might be needed.

Key Informant Interviews

The last research objective of this study was to find out farmers' constraints, if any, in converting from conventional vegetable farming to organic vegetable farming in the study sites.

This study used a mixed method, including quantitative and qualitative methods for data collection and analysis. To answer research objective eight (a qualitative method), interviews with key informants in three different categories (policy maker for organic farming in Indonesia, regional extension agents and marketing people of organic vegetables) were used. Results of the interviews were summarized as follows. All of the interviews were transcribed in Appendix F.

Interview Results from Policy Makers of Organic Farming in Indonesia

<u>Description of Interviewee</u>

Policy maker of organic farming in Indonesia (Ms. A)

Ms. A was a government officer at the Department of Agriculture located in Jakarta. She had served as a government officer more than ten years and worked at the Quality and Standardization Bureau since 2005. Her main task was to assist in developing a policy draft of organic farming in Indonesia. She looked to be in her late 30s. The researcher was introduced to her by an undergraduate student at Bogor Agricultural University, whose advisor was a researcher in the BNBAF project. Since the thesis topic of the student was related to organic farming, he had an appointment with Ms. A to ask about organic farming policy in Indonesia in August 2007. For the second interview, the researcher went to Ms. A's office by herself and she gave the researcher materials about organic farming policy in Indonesia.

Through an interview with Ms. A, details of current organic agricultural policy in Indonesia were revealed. All materials cited in this section were given by Ms. A.

Go Organic 2010 Program

In 2001, the Department of Agriculture established a program called "Go Organic 2010," with the purpose to be one of the world's biggest exporters of organic commodities by 2010 (Novianty and Andoyo, 2005). Main activities of this program were:

1. Human resource development and knowledge dissemination,
2. Regulation development, and
3. Development of organic certification agencies.

The purpose of the first major activity was to increase awareness of organic agriculture. As a part of a national campaign, several trainings, workshops, and seminars were conducted in various places. The government has tried to diffuse organic agriculture as a certifiable management system. For this purpose, the second and the third major activities are important to implement the system correctly. This program was set as the development step of organic farming in Indonesia (Centre for agriculture standardization and accreditation, 2006; Novianty and Andoyo, 2005).

Organic Certification System

Organic certification is relatively new to Indonesia. In 2002, the government created the National Standard for Organic Food (SNI). According to Ms. A, the current SNI is voluntary and violators of the SNI are not punished. Those who are certified and violate the standard can be sanctioned by their certification agency, however. There are several domestic certification agencies and foreign certification agencies (Novianty and Andoyo, 2005).

Competent Authorities

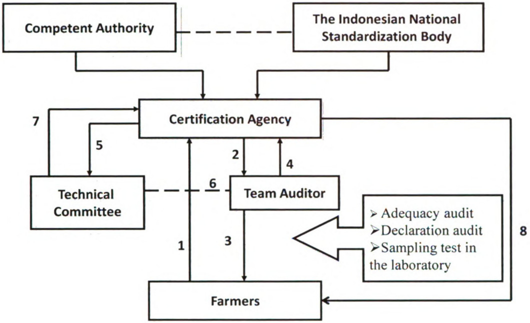
In the organic certification system, the role of government is very important to guarantee quality and certification for consumers. A nationwide working group and two units of government play an important role as competent authorities in the certification system. They are;

1. The Indonesian National Standardization Body/National Accreditation Committee (BSN/KAN)
2. The Centre for Agriculture Standardization and Accreditation (PSA)
3. The National Agency of Drug and Food Control of Indonesia (NA-DFC)

BSN consists of stakeholders involved in organic agriculture in Indonesia including PSA, NA-DFC, certification agencies, farmers, consumers, NGOs, technical experts, universities, and the private sector. The main task of BSN is to publish national standards, including regulations on accreditation and certification, on organic agricultural products. PSA and NA-DFC belong to the Department of Agriculture in Indonesia. The main task of PSA is to design the standards, guidelines and oversight system for organic inspection and certification. It is also offering training and gives recommendation on approvals of certification agencies. The main task of NA-DFC is to monitor processed foods. NA-DFC has developed regulations on the monitoring of organic processed food (Novianty and Andoyo, 2005; Centre for agriculture standardization and accreditation, 2006).

Process in Obtaining an Organic Certification

Farmers first submit all required documents to the certification agency. The agency checks the processes based on the regulations developed by the legal authority. The agency checks all documents and asks the audit team for an inspection. After that, the audit team reports the results to the certification agency. The agency then gives all documents and results of the inspection to the technical committee. Once the committee receives all materials, they exchange their results with the audit team for cross checks. After the committee confirms all results, the materials are returned to the certification agency again. If no problems are found, the farmer is finally certified as an organic farmer. The farmer needs to pay a fee for the organic certification. Figure 12 shows all processes involved in obtaining organic certification. Now the certified farmer can put the organic logo mark on his products. Figure 13 is the official organic logo. According to Ms. A, a farmer could receive a subsidy to obtain organic certification. If a farmer is approved by the Department of Agriculture, he can get a subsidy, which is 10 percent to12 percent of the total cost of the organic certification.



Source: Centre for agriculture standardization and accreditation, 2006.

Figure 12. Process to Obtain an Organic Certification

Source: Centre for agriculture standardization and accreditation, 2006.

Figure 13. Organic Logo Mark for "Competent Authority Organic Food"

Interview Results from Regional Extension Agents

<u>Description of Interviewees</u>

Regional extension agents (Mr. B and Mr. C in West Java; Mr. D and Mr. E in Bali)

Mr. B and Mr. C were extension field workers at the Rural Extension Center (REC) in the Ciawi region in West Java. Mr. B served as an extension worker for 15 years and Mr. C for five years. Mr. B looked to be in his early 40s and Mr. C was in his mid 20s. Their main tasks were to provide useful information about crop production for farmers by visiting their assigned areas, and solving farmers' various problems through the extension center. Periodically they conducted a variety of workshops in different areas. A contact farmer (*kontak tani*) at the study site of West Java kindly took the researcher to the REC and introduced the researcher to the extension field workers. The center was located about three kilometers from the study village. Since extension workers were not often in the office, the researcher visited the office several times to catch them for interviews.

Mr. D and Mr. E were extension field workers at the REC at the Batriti sub-district in Bali. Mr. D and Mr. E served as extension workers for more than 20 years. Both of them looked to be in their late 40s or early 50s. Their main tasks were nearly the as Mr. B and Mr. C. As in West Java, a contact farmer (*kontak tani*) at the study site of Bali kindly took the researcher to the REC and introduced them to the extension field workers. The center was located about five kilometers from the study village, which was difficult to visit because of the lack of bike taxis, unlike West Java. Thus the researcher planned interviews on Mondays, when the center staff had weekly meetings.

Through interviews with Mr.'s B, C, D, and E, the extension system and its various organic farming activities in West Java and Bali were revealed.

Current extension system and activities related to organic farming

Before decentralization in 1990s, extension systems were in various parts of the Department of Agriculture and never integrated (see Figure 5 in chapter II). In the Bali study site, extension systems in the district of Tabanan were independent from the Department of Agriculture. However, according to Mr. D and Mr. E, bottom of the extension system including REC did not change. In the study site of West Java, the extension system still belongs to the Department of Agriculture and Forestry in Bogor district. However, the bottom parts of their extension system including REC were changed. The new REC called *unit pelaksana teknis dinas (UPTD)* were placed at the sub-district and village level. Current extension systems in the study sites include the organizational structure of extension unit in Tabanan district and the organizational structure of department of agriculture and forestry in Bogor district. (Appendix F)

According to Mr. B and Mr. C,

> "In the Bogor district, the extension system belongs to the Department of Agriculture and Forestry. This center is one of UPTD (unit *pelaksana teknis dinas*), which means the REC. Before the decentralization, the RECs located at each sub-district with a different name (balai penyuluhan pertanian, BPP). But now the centers are placed by functions. There are 20 UPTD in Bogor district; 12 for agricultural extension, two for agricultural machinery, two for rice seedlings, three for lumber, and one for dry fields. This center is one of 12 agricultural extension function centers."

Mr. B and Mr. C also explained about their UPTD;

> "This center covers three sub-districts (Cisarua, Megamedung, and Ciawi) with 34 villages. Cisarua sub-district has 10 villages; two field extension workers for crop production and one for livestock are assigned. In the Megamedung sub-district, there are 11villages; two field extension workers for crop production and one for livestock are assigned. Ciawi sub-district has 13 villages; three field extension workers for crop production and one for livestock are assigned. For all regions, there is a field extension worker for pest and plant pathology in the center."

In Bali, Mr. D and Mr. E told about their BPP;

> "This center covers one sub-district (Baturiti) with 12 villages. An extension field worker is assigned in each village."

While surveying vegetable farmers, the researcher listened to complaints about extension workers in both West Java and Bali. They said that extension workers did not come to their villages frequently. One of them said he saw the extension worker more than two months ago. If the extension workers did not come to their villages, they were useless to farmers. At that time, the researcher simply thought that extension workers stayed and worked in the office and did not want to see farmers who lived far from their office. This assumption was incorrect. Problems existed in the extension system. Especially after decentralization, working conditions for extension workers were getting worse and worse. This resulted in complaints about extension workers.

Mr. B and Mr. C explained these changes before and after decentralization in West Java:

> "Before **decentralization,** there were five types of extension field workers: vegetable, cereal, pest and plant pathology, livestock, and fishery. Also an extension worker was assigned to only one or two villages. Thus they could rotate farmers frequently. But now an extension worker has to rotate through more than five villages and many of them have to cover different fields. For example, an extension worker may have been assigned to the fishery field, but now has to

> work in the livestock field. Also, the worker could see a farmer every two weeks, but now once every two months or as needed. So, it is very difficult to provide useful information for farmers effectively."

Similarly, Mr. D and Mr. E told of Bali's changes for extension workers;

> "The one extension worker has to cover all agricultural fields. Before **decentralization**, there were five types of extension field workers: vegetable, cereal, pest and plant pathology, livestock, and fishery. But now an extension worker has to cover all fields. So, it is very difficult to provide useful information for farmers efficiently. Every Monday all extension field workers gather to attend the weekly meeting and they share all information with other extension workers."

This is a very serious structural problem within the extension systems in West Java and Bali.

Extension workers in West Java and Bali were asked if there were some programs/activities related to organic vegetable production, and they said no. However, both RECs in West Java and Bali had demonstration farms and tested compost/manure there. In West Java, they had taught IPM to farmers.

Interview Results from People Marketing Organic Vegetables

<u>Description of Interviewees</u>

People marketing organic vegetables (Mr. F and Mr. G in West Java; Mr. H andMr. I in Bali).

Mr. F and Mr. G were organic farmers in the West Java study site. However, Mr. F lived in Bogor and Mr. G lived in Jakarta. They worked in their farms about three or four times a week. They grew organic vegetables and sold them directly to consumers in Jakarta. Both of Mr. F and Mr. G knew about the organic certification system. However

they did not think to get the certification because they felt strongly that they grew real organic vegetables, and had already developed strong, reliable relationships with the consumers without the certifications. They also did not purse certification because it was costly for them.

Mr. F started organic farming in 2001 and grew around 40 varieties of vegetables on 2.2 hectares of farm land with about 20 employees. He sold and delivered organic vegetables to two Japanese supermarkets and about 120 individual home-delivery customers in Jakarta twice a week (Monday and Thursday). He was in his mid 30s. The researcher had stayed at a farmer's house near Mr. F's farm during the survey. The researcher first met him at the beginning of the survey in July 2007. After that, the researcher visited his farm several times for interviews, and had an opportunity to follow the vegetable delivery to Jakarta. At that time, the researcher also met with his individual customers, and arranged to interview one of the Japanese customers on another day.

Mr. G started organic farming in 2000 and grew around 20 varieties of vegetables on 1.3 hectares of farm land with five employees. He sold and delivered organic vegetables to several organic food retail shops, about 20 individual home-delivery customers, and two banks in Bogor and Jakarta twice a week (Tuesday and Friday). He was in his mid 40s. The researcher had stayed at farmer's house not so far from Mr. G's farm during the survey. The researcher met him at the beginning of the survey in July 2007. After that, the researcher visited his farm several times for interviews, and had an opportunity to follow his vegetable delivery to Bogor.

Mr. H was a businessman in Bali. He ran a restaurant and a hotel in Ubud. To provide safe foods to his restaurant and hotel, he started organic farming on one hectare of farm land and ten cows in the study village in 2003. In the study village, there was a farm manager who managed all farming operations with several employees, following Mr. H's orders. Mr. H came to the farm at least twice a month to check the farm. At Mr. H's farm, manure produced by the cows was used for growing vegetables. The cows were raised for meat and sold in Java because most people in Bali were Hindu, and did not eat beef. Almost all vegetables from this farm were consumed at Mr. H's restaurant and hotel, but sometimes extra vegetables were sold at a farmers' market in Ubud. During the survey in Bali, the researcher stayed in a neighboring farm house close to the manager's house. Mr. H was in his mid 50s. The researcher was introduced to the manager by the neighboring farmer and the researcher met with Mr. H through the manager. The researcher not only interviewed Mr. H on his farm, but also went to his restaurant to taste the food made with the organic vegetables from the farm.

Mr. I was a broker who collected and bought various vegetables, including some organic vegetables, from farmers around the study site. He was originally from East Java and moved to Bali about 10 years ago. He used to stay in Australia for three months for business and had several opportunities to see organic vegetable markets there. At that time, he recognized that organic vegetables were good for people's health and the environment, and felt he had a potential market in Indonesia, especially Bali, because of the foreign tourist trade. He looked to be in his late 40s. The researcher met with Mr. I when the researcher interviewed with a respondent in the study site in October 2007. During the interview with the respondent, Mr. I came to the respondent's house to pick his vegetables. At that time, the interview was suspended and the researcher was introduced to Mr. I by the respondent. The researcher interviewed Mr. I when he came to the study site. He also helped find other organic farmers who sold their products in Bali. With his help, the researcher could find an organic farmer who grew organic vegetables in a northern part of the study site. The farmer sold his vegetables to hotels and restaurants in Bali. However, the researcher could not meet with the farmer directly, but did obtain his price list for his vegetables.

Through interviews with Mr.'s F, G, H, and I, knowledge of their sales destinations, sale methods, and current issues of organic vegetables marketing were discovered.

Sales Destinations and Methods of Organic Farmers

In West Java, individual home-delivery customers were the major sales destinations of Mr. F and Mr. G. Mr. F had about 120 customers and delivered organic vegetables twice a week to Jakarta by car. Among the customers, 75 percent were Japanese. Mr. G also sold his organic vegetables to individual home-delivery customers by car, but his customers were all wealthy Indonesian households. The researcher observed this difference when accompanying Mr. G on vegetable deliveries. When the researcher saw organic farmer Ms. C in the study village, the researcher asked her if she had some individual home-delivery customers among her organic vegetable customers. She answered yes, and noted that her individual home-delivery customers were mainly rich Chinese-Indonesian households in Jakarta; there were also a few Korean customers. After the researcher observed the differences between home-delivery customers of the three organic farmers in West Java, she asked Mr. F how he had attracted Japanese customers a couple of times, but it wasn't until the researcher interviewed Ms. K, who was Japanese and one of Mr. F's individual home-delivery customers in Jakarta, that she understood.

In August 2007, the researcher interviewed Ms. K at her house two days after the she had accompanied Mr. F while doing vegetable delivery in Jakarta. When the researcher handed the vegetables to her, she mentioned that she had bought the vegetables from Mr. F for long time. At that time, the researcher wondered if Ms. K knew how Mr. F attracted Japanese customers.

Ms. K had lived in Jakarta for 20 years. Her husband was an accountant and worked at a Japanese company in Jakarta. She, her husband and her two sons also spent their time in Indonesia until their sons graduated high school. The sons were now on their own, and Ms. K lived with her husband in a house. She looked to be in her late 50s or early 60s.

According to Ms. K, Mr. F received training in organic farming at the OISCA (a Japanese NGO), and started an organic farming business afterward in the study site, with the landowner's approval. One day Mr. F met with a JICA (Japan International Cooperation Agency) expert whose specialization was crop production. At the early stage of his organic farm, Mr. F had many problems with his vegetable production. Mr. F got advice from the expert. The expert's wife was also there. And she had experience in managing consumers at Japanese organic supported agricultural groups. In these groups, consumers support organic farmers by helping with farm and shipment work. Because of

Mr. F's dedication, she decided she wanted to support Mr. F's organic farming like the Japanese groups. At that time (around 2002), Jakarta had no organic vegetable home-delivery service. Many Japanese wives/mothers were very interested in organic vegetables. The expert's wife started to ask her friends if they wanted to buy organic vegetable from Mr. F's farm. Slowly and surely the members increased. The expert's wife disseminated farm information to the consumer groups by newsletters, and sometimes took members to Mr. F's farm to enhance their understanding about organic farming. Mr. F also accepted the consumers' requests, and they built a very good relationship. Mr. F's honest and sincere character was instrumental in increasing the number of Japanese consumers.

Ms. K helped the researcher understand the reason why Mr. F had so many Japanese customers.

In Bali, according to Mr. H and Mr. I, mainly organic vegetables were sold and consumed to hotels and restaurants in the resort areas. Mr. I also mentioned that some of the organic vegetables were sold to supermarkets in Denpasar, and recently the supermarkets had requested to obtain the "organic certificate." This may become a big obstacle for small farmers to selling organic vegetables.

Current Issues in Organic Vegetable Marketing

In the interviews, organic farmers were asked about current issues in organic vegetable marketing. Interestingly, all of them pointed out the same issue: many people did not know or understand what organic vegetables were. Mr. F mentioned that some of new organic farmers did not understand what exactly organic farming was. He said that,

> "Newcomers as organic farmers indicate 'organic vegetables' without understanding 'true organic vegetables' to sell their products—their 'organic vegetables' are not organic vegetables primarily. If some farmers sell 'fake' organic vegetables, customers may not start to trust Mr. F's organic vegetables either."

Mr. I mentioned that consumers did not know about what "real" organic vegetables were. When Mr. I sold organic vegetables to supermarkets in 2002, they did not request the organic certificate because there was no organic certification system in Indonesia at that time. However, Mr. I failed to sell organic vegetables to the supermarkets because they did not accept "poor looking" vegetables. They did not understand what "real" organic vegetables were; organic vegetables tended not to be as good looking as the conventional vegetables, and may have included a few worm-eaten holes on the vegetables.

Prices of Organic Vegetables

According to Mr. I, higher prices for organic vs. conventionally grown vegetables was another reason why organic vegetables failed to sell in supermarkets in 2002. Nowadays this is a commonly known fact about organic vegetables, but the supermarkets in Bali were not that knowledgeable at the time.

Table 32 shows comparisons of target organic vegetable prices among organic farmers.

Table 32. Comparison of Target Vegetables' Prices in 2007

Vegetables	Farm gate price of Vegetables (Rp/kg)						
	West Java					Bali	
	Organic Farmer A (Mr. F)	Organic Farmer B (Mr. G)	Organic Farmer C	NGO D	General farmer respondent group*	Organic Farmer E	General farmer respondent group*
Cabbage	15,000	10,000	7,000	6,500	1,209	N/A	859
Tomato	18,000	14,000	7,600	7,500	1,778	N/A	1,196
Carrot	15,000	12,000	6,000	6,000	879	12,000	1,211

*Average vegetable prices from the survey. N/A indicates data not available.

There were no standard prices among organic farmers, but one thing was obvious – prices for organic vegetables were much higher than the vegetable prices obtained through the survey—at least four times as high.

Organic Farming Training Place

Through the interviews, the researcher learned of a NGO, called NGO D, in West Java; Mr. F and Mr. G stayed at the NGO D for a period of time to learn how to grow organic vegetables when they first started farming. According to Mr. F and Mr. G, NGO D was a pioneer in organic farming in Indonesia, and was not far from the study site. The researcher visited NGO D in August 2007.

NGO D was established to disseminate organic farming practices by a Swiss pastor in 1984. NGO D provides various training programs for people who want to study organic farming. Many people visit NGO D to learn organic farming. NGO D has 16 hectares of land in total, and currently uses 10 hectares for vegetable production. Currently 110 employees have worked there – 40 people for farm work, 20 people for offices work, and 50 people for construction work.

NGO D has a store near the farm. Thus customers can buy organic vegetables directly from this NGO D. There are two main market channels; one is NGO D – supermarkets – consumers, the other is NGO D – NGO's agents – consumers. NGO D has 15 agents in Bogor and Jakarta. These agents buy vegetables from the NGO D for a special price and sell the vegetables at their prices. Total income of this NGO D comes from the agents' sales (70 percent), supermarkets and the NGO's store (30 percent). To provide enough quantity and variety of vegetables, 25 contract farmers grow organic vegetables following the NGO's methods exactly.

Currently NGO D has three main obstacles. The first problem is plant diseases and poor growing weather. In recent years, there have been long dry seasons, or too much rain during the rainy seasons. This unpredictability made it very difficult to control diseases. Workers' habits were another obstacle. Some employees were rough, which influenced vegetable production poorly. Marketing is the third obstacle. There are still many people who do not understand what organic vegetables are, and don't buy them.

Issues for Organic Farming in Indonesia

Since the price of organic vegetables is at least four times higher than conventional vegetables (see Table 32), farmers may have the opportunity to increase their income if they become organic farmers.

The results of interviews with key informants indicated that the following factors limit acceptance of organic farming: 1) limited interaction with extension agents; 2) limited contact between farmers and consumers; 3) lack of enforcement of standards for organic produce; 4) the high cost of certifying produce as organic; and 5) weather conditions, especially long dry seasons and excessive precipitation during the rainy season, which makes control of diseases difficult.

CHAPTER V

SUMMARY CONCLUSION, IMPLICATIONS, AND RECOMMENDATIONS

Summary

In recent years, there has been an increased demand for vegetables, including those organically produced, by farmers in the highlands in Indonesia. This demand is seen as an opportunity to develop agricultural production and increase the income of small scale farmers. One of the challenges in developing organic agriculture in Indonesia is increasing farmers' knowledge of organic farming methods to grow high quality of organic products (Surono, 2007).

The agricultural extension system helps farmers adopt new farming technologies. They may obtain this knowledge through communication and educational processes. Through these processes, farmers will form an attitude toward a particular technology, and will decide whether or not they will adopt this technology. Once they decide to adopt it, it will be implemented. Since the lack of extension is a constraint in developing organic agriculture in Indonesia, it is very important to understand what factors determine 1) farmers' knowledge of organic farming methods, 2) their attitudes toward such methods, and 3) their adoption of the methods. However, until 2007, no systematic technology adoption study of the organic conversion process had been conducted in Indonesia.

Recognizing the need for research and development of organic agriculture, Tokyo University of Agriculture initiated a research-cum demonstration project in 1999, in cooperation with Bogor Agriculture University and Udayana University of Indonesia. The goal of the project, known as Development of New Bio-Agents for Alternative

Farming (DNBAF), was to develop bio-pesticides to promote sustainable farming systems (TUA, 2005). Several bio-pesticides were developed during the project period (Dadang, et al., 2005; Sumiartha, et al., 2005; Sudana, et al., 2003). In January of 2005, the DNBAF project set up organic vegetable pilot farms in two sites – West Java and Bali – in order to field test the use of bio-pesticides and compost.

Since the DENBAF project is an example of organic conversion, this study investigated farmers' perceptions of organic farming methods, including use of bio-pesticides and application of compost in the West Java and Bali DENBAF project sites. The study was conducted in communities surrounding the model farms. It examined two organic vegetable production practices: the application of biological insecticides (bio-pesticides) and the use of organic fertilizers (compost); on three vegetable crops – cabbage, tomato, and carrot. These are the major vegetables grown in these areas, and the selected technologies were being tested on the pilot farms.

The overarching goal of this study was to determine farmers' perceptions of organic vegetable production practices, including bio-pesticides and compost in West Java and Bali, Indonesia. Specifically, the objectives of this study were to:

1. Describe vegetable production systems, including the target vegetables (cabbage, tomato and carrot) in the study sites.
2. Determine demographic-socio-economic characteristics of the respondents in the study sites.
3. Ascertain farmers' awareness of target organic vegetable production practices, including the application of bio-pesticides and the use of compost.
4. Ascertain farmers' attitudes towards these practices.

5. Find out if farmers in the area had adopted these practices or intended to adopt them in the near future.
6. Determine the factors associated with awareness of these practices.
7. Determine the impact that awareness of, and attitude toward these practices had on vegetable farmers' decisions to adopt or intention to adopt, these practices.
8. Ascertain farmers' constraints, if any, in converting from conventional vegetable farming to organic vegetable farming in the study sites.

The following hypotheses were tested in this study:

(1) socio-economic variables will affect the familiarity with bio-pesticides and compost. The socio-economic variables are: respondent's location, gender, age, education level, household size, number of family laborers, farming experience, farm size, distance to the pilot farm, irrigation sources, land tenure status, net revenue of cabbage, tomato, carrot production; exposure to the pilot farm and any information source groups (media, extension, farmer and commercial group). And,

(2) Farmers' familiarity with the target organic vegetable practices will affect their attitude toward these methods, and likely increase the probability that the farmer will adopt organic farming methods.

Data were collected using a mixed method: face-to-face surveys and interviews with key people. The face-to-face surveys were conducted with 210 farmers within a population of 627 vegetable farming households surrounding the pilot farms in West Java and Bali, Indonesia, selected at random. A questionnaire was used for the survey, developed following recommendations from existing literature, addressing survey research and later modified, based on the results of pilot tests and input obtained from the dissertation advisor, the Japanese DNBAF project leader, and the project researchers in Indonesia. The questionnaire was translated into Bahasa Indonesian, and the survey was conducted by the author with two Indonesian research assistants in Bahasa Indonesia. The study hypothesis (1) was tested by a binary logit analysis, and hypothesis (2) was tested by a path analysis.

The interviews with key informants was done using a snowball sampling to collect detailed information from persons representing the Department of Agriculture, the agricultural extension agency, and people involved in an organic vegetable market channel in the study sites. A total of 10 people from the three groups were interviewed by the researcher in Bahasa Indonesia. The interview schedule was developed using literature reviews that addressed qualitative research methods, and later modified through an expert panel review process. Field notes were made for each interviewee and the verbal data were summarized based on the field notes.

The main results of this study were as follows:

In general, both study sites could grow vegetables throughout the year if there were irrigation facilities. Various vegetables were grown in the study sites including cabbage, carrot, tomato, chili, beans, and cucumber. In West Java, some farmers grew crops that tolerate low moisture, such as chili and sweet potato, during the dry season because they did not have irrigation. Also, a multiple cropping system, *Tumpangsari,* was frequently used there. In cabbage and tomato production, farmers used organic and synthetic fertilizers and pesticides, but they use very little synthetic pesticides in carrot production.

The average respondent was 41 years of age, in a four-person household with two family members contributing to farm labor, had about 18 years of farming experience, and live in a house about 1.2 kilometer from the pilot farms. The majority of respondents were male in both West Java and Bali. In general, respondents in Bali had a higher level of education than in West Java. Around half of the respondents in West Java did not complete primary school, but a majority of respondents in Bali completed at least primary school. In West Java, the majority of respondents did not have secure land tenure status, but a majority of respondents in Bali did. Also, a third of the respondents in West Java lacked irrigation, however almost of all respondents in Bali had irrigation. In general, a third of the respondents in West Java recognized the DEBAF project pilot farm, however less than ten percent of respondents in Bali did. In general, respondents in both West Java and Bali had similar information sources for their vegetable production, including other farmers, farmers' groups, extension agents, and commercial companies/agricultural retail stores, or about three information resources on average.

Regarding awareness of target organic vegetable practices, respondents in West Java knew about bio-pesticides and compost; respondents in Bali did not know about bio-pesticides, but knew about compost.

Regarding attitudes toward the organic practices, respondents in West Java had positive attitudes toward use of bio-pesticides and compost. Respondents in Bali had positive attitudes toward use of compost, but they had some negative attitudes toward the use of bio-pesticides in terms of compatibility and complexity. One possible reason why respondents in Bali had some negative attitudes toward bio-pesticides is that they did not know much about them.

Regarding adoption rates of the organic practices and the intention to adopt the organic practices, adoption rate of bio-pesticides in cabbage and tomato production was less than 10 percent for both West Java and Bali.

Adoption rates for compost-only use in cabbage and tomato production was also less than 10 percent in the both sites. For carrot production, around 12 percent of respondents use bio-pesticides and compost only in both sites. Thus, about 90 percent of respondents in West Java and Bali did not practice the target organic methods in their vegetable production. More than half of respondents in the both sites intended to adopt the target organic practices in the future. However, it might be possible that there was some politeness bias in the respondents' answers to the intention questions to the researcher. In Bali, the most frequent response to why farmers did not adopt bio-pesticides was "I don't know how to make bio-pesticides"; the most frequent response in West Java was that "it is difficult to find raw materials to make bio-pesticides." Also, the most frequent response in both West Java and Bali to why farmers did not adopt compost was that "using only compost takes longer than chemical fertilizer to harvest vegetables." The main reason why farmers would not adopt bio-pesticides in both West Java and Bali was that "using bio-pesticides may reduce vegetable production because it cannot easily kill pests." The most frequent response in West Java to why farmers would not adopt bio-pesticides was that "I want to harvest vegetables quickly"; the most frequent response in Bali was that "using compost only may not grow vegetables well."

As a result of the binary logit analysis, the data partially supported the hypothesis (1). The results indicated no significant influence of any of the variables, except exposure to the pilot farm (EXPO), educational level of completed primary school (EDU3), educational level of completed junior high school (EDU4) and distance from respondent's house to the pilot farm (DIS) on the probability of being familiar with bio-pesticides; no significant influences of any variables except exposure to the pilot farm (EXPO), location of respondent (LOCA), gender of respondent (GEN), and commercial information source groups (IFG_COMMER) on the probability of being familiar with compost. These findings imply that an educational level of at least primary school, distance to the pilot farms, and exposure to the pilot farms would be the key factors in increasing farmers' awareness of bio-pesticides. Gender, exposure to the pilot farms, and commercial information source groups would be the key factors to increase farmers' awareness of compost. Especially, exposure to the pilot farms would be the most important factor to increase farmers' awareness of target organic vegetable production practices.

As a result of the path analysis, the data did not support the hypothesis (2). The fit indexes showed these were not good fit of the model to the data. The possible reasons why the data did not support the study hypothesis (2) were: 1) the target organic vegetable production practices as an innovation had not been disseminated widely by the DENBAF project; and 2) small sample size.

The results of the interviews with key informants revealed the program called "Go Organic 2010," established by the Department of Agriculture in 2001 with the goal to be one of the biggest exporters of organic commodities in the world by 2010. To establish an organic certification system in Indonesia, the government created the National Standard for Organic Food in 2002. However, the current National Standard for Organic Food (SNI) is voluntary and violators are not punished. So far, there are several domestic certification agencies and foreign certification agencies, and farmers can obtain the organic certifications if they clear all checks and pay a fee.

Before decentralization in the 1990s, Indonesian extension systems existed in several parts of the Department of Agriculture and were not integrated. However, extension systems in the study sites were changed and re-organized. Many problems exist within the system. Working conditions of extension workers are poor. This is a very serious structural problem for extension systems in West Java and Bali. Extension workers were asked if they conducted programs/activities related to organic vegetable production. There were no activities directly related to organic vegetable productions in either West Java or Bali. However, both Rural Extension Centers in West Java and Bali had demonstration farms and tested compost/manure there.

In West Java, individual home-delivery customers were a major sales destination for organic farmers. It is important to develop a strong, reliable relationship between organic farmers and consumers for this marketing system. In Bali, farmers were recently told by supermarkets that they need to obtain an "organic certificate" to sell organic vegetables. This may become a big obstacle for small farmers in selling organic vegetables to supermarkets, because of the high price to obtain organic certifications. Organic farmers were asked about current issues in organic vegetable marketing. Interestingly, all of them pointed out the same issue – many people did not know or did not understand what organic vegetables were. There were no standard prices among organic vegetables. In general, prices for organic vegetables were much higher than the vegetable prices obtained by the survey — at least four times as high. This may be a good incentive for farmers to adopt organic practices to increase their income. However, there are some issues in organic farming in Indonesia as follows.

Organic farming Policy

- Lack of enforcement of standards for organic produce (farmers can deviate easily).

Extension system

- Extension agents cannot make home visits and advise farmers frequently because of organizational problems — farmers cannot get useful information when they need it.
- No programs related to organic farming. This means farmers do their own trial and error to confirm appropriate organic farming techniques.

Marketing

- Need to expand the marketing channels — supermarkets demand organic certifications to sell; farmers need to develop reliable relationships with consumers, and need to grow "true" organic vegetables to develop this relationship.
- Many people do not know about organic farming.

Technical

- Difficult to control plant diseases because of the long dry seasons, and too much precipitation in rainy seasons.

Conclusions

Both study sites could grow vegetables throughout the year if there were irrigation facilities. Various vegetables were grown in the study sites including cabbage, carrot, tomato, chili, beans, and cucumber. In West Java, some farmers grew crops that tolerate low moisture, such as chili and sweet potato, during the dry season because they did not have irrigation. In addition, a multiple cropping system, *Tumpangsari,* was frequently used. For both study sites, farmers used organic and synthetic fertilizers and pesticides for cabbage and tomato production, but used very little synthetic pesticides in carrot production.

The study results revealed that the data partially supported the proposed conceptual model. As a result of the binary logit analysis, the factors associated with awareness of target organic vegetable production practices including bio-pesticides and compost in the study sites were: location, gender, educational level, distance to the pilot farms, exposure to the pilot farm, and information sources. However, as a result of the path analysis, there were no statistically significant relationships between awareness of the organic practices, attitude toward the practices, and intention to adopt the practices. The possible reasons why the data did not support the conceptual model were: 1) the target organic vegetable production practices as an innovation had not been disseminated widely by the DENBAF project; and 2) small sample size.

The results of interviews with key informants indicated that the following factors limit acceptance of organic farming: 1) limited interaction with extension agents; 2) limited contact between farmers and consumers; 3) lack of enforcement of standards for organic produce; 4) the high cost of certifying produce as organic; and 5) weather conditions, especially long dry seasons and excessive precipitation during the rainy season, which makes control of diseases difficult.

Implications

The results of this study have implications for the Department of Agriculture, the DNBAF project, extension agents, universities, and NGOs in Indonesia, which play an important role to develop organic farming in Indonesia.

Effective Use of the Diffusion of Innovation Theory

Study results showed that the data partially supported the proposed conceptual model. The conceptual model was developed based on the diffusion of innovation theory (Rogers, 1995). It could be expected to apply the theory to increase farmers' knowledge of organic agricultural practices in Indonesia. According to Rogers (1995), characteristics of earlier knowers are different from late knowers at the knowledge stage of the theory. Some characteristics of the earlier knowers are that they are better educated, and have higher social status and wider social networks. During the survey, some farmers mentioned that they knew/learned about bio-pesticides and compost because they worked at an organic farm in the West Java study site. There were five organic farmers in that study site; all of them completed at least high school. Four out of five of them live in Jakarta; two out of five of them used to work at a bank in Jakarta and have wide social networks there. The organic farmers have visited their organic farms two to four times a week. Usually local farmers were hired by the organic farmers to manage the organic farms. For the local farmers, it was an opportunity to make money and to be able to learn about organic farming methods. However, these five organic farmers managed their organic farms individually and sought out needed information about organic farming methods and marketing by themselves. This was sometimes difficult for them. If extension agents can provide the necessary information to organic farmers and collaborate with them to increase their knowledge of organic farming methods, it could be beneficial to the extension agents, organic farmers and potential organic farmers.

Effective Use of Demonstration Farms

Results showed that exposure to the pilot farm (EXPO) had a significant positive effect of at least a 1 percent level in the binary logit analysis with dependent variables both "familiarity with bio-pesticides" and "familiarity with compost," indicating that vegetable farmers who were exposed to the pilot farm had higher probabilities of being familiar with bio-pesticides and compost than farmers who were not exposed to the pilot farm. Also, the negative coefficient of distance from respondent's house to the pilot farm (DIS) was significantly different from zero at the 10 percent level in the binary logit analysis with dependent variable "familiarity with bio-pesticides." This indicated that farmers who lived closer to the pilot farm had a higher probability of being familiar with bio-pesticides than who lived far from the pilot farm. These is evidence that pilot farms (demonstration farms) were effective tools in increasing farmers' awareness of target organic vegetable production practices, including bio-pesticides and compost. Thus, extension educators need to use demonstration farms effectively to increase farmers' knowledge of bio-pesticides and compost.

Focusing on Farmers with at Least a Completed Primary School Educational Level to Increase Farmers' Knowledge of Bio-pesticides

Results showed that the positive coefficients of educational levels of completed primary school and junior high school were significantly different from the zero at 5 percent level in the binary logit analysis with dependent variable "familiarity with bio-pesticides." The odd ratio indicated that farmers who completed primary school had about six times higher probability of being familiar with bio-pesticides compared to the farmers who never went to school. Also, the odd ratio indicated that farmers who completed junior high school had about 11 times higher probability of being familiar with bio-pesticides compared to the farmers who never went to school. There were 61.6 percent of respondents who did not complete primary school in West Java and 18.5 percent in Bali. To increase farmers' knowledge of bio-pesticides, extension educators may need to use mass media to disseminate information, and invite farmers with at least an elementary school education to participate in their programs, especially in West Java.

Effective Use of Commercial Information Source Groups to Increase Farmers' Knowledge of Compost

Results showed that the positive coefficient of the total number of "information source" checks for the commercial information source group (IFG_COMMER) was significantly different from zero at the 10 percent level in the binary logit analysis with dependent variable "familiarity with compost." This indicates that farmers who obtained information for their vegetable production from market people and commercial company/agricultural retail stores (commercial information group) had higher probability of being familiar with compost than who did not obtain information from this group.

In each of the village study sites, there was at least one agricultural retail store. The percentages of the respondents who obtained information from commercial companies/agricultural retail stores and market people in West Java were 23 percent and 11 percent, respectively. In Bali, percentages of the respondents who obtained information from mass media or commercial companies/agricultural retail stores and market people were 77 percent and 12 percent, respectively. According to the interviews with regional extension agents, they could not visit farmers frequently because of organizational problems. Therefore, extension educators should consider a strategic way to use these agricultural retail stores in order to increase farmers' knowledge of compost. Therefore, extension educators should consider the strategic way to use of these agricultural retail stores in order to increase farmers' knowledge of compost.

<u>Policy-Related Suggestions to Develop Organic Agriculture</u>

According to the key informant interview with policy makers, though the government created the National Standard for Organic Food (SNI), the current SNI is enforced by third parties, including the Indonesian organic certification agencies. If farmers deviate from the SNI, they are not able to obtain/renew the organic certificates, nor sell their organic products for premium prices. Prices of organic vegetables are higher than conventional vegetables — at least four times as high, according to interviews with organic farmers. Thus, some farmers may sell their conventional products as "organic products" with a higher price than conventional products because of the lack of enforcement. Consumer confidence on "organic products" in the future may drop, creating a harmful situation for "true" organic farmers.

According to interviews with organic farmers in West Java, they sold their vegetables as "organic vegetables" without organic certifications. They have made a strong effort to grow "true" organic vegetables to keep consumers' confidence on organic vegetables for many years. They sell their vegetables through home-delivery, and have developed a confident relationship with consumers. In Bali, some of the organic vegetables are sold to supermarkets in Denpasar, but recently the supermarkets were required to obtain the "organic certificate." In the interviews, organic farmers mentioned that the cost of obtaining organic certification was expensive. Suroso (2008) mentioned that the cost of organic certification depends on the length of time required for the inspection. When implementing organic farming in the process of certification and inspection, the cost is required lower by farmers. After the inspection, an Indonesian organic certification agency will charge the cost of inspection and certification activities, which amount to approximately 10 million to 11 million Rp. These fees include registration for application fees, appraisal fees, organic certification, and the cost of monitoring visits, until the cost of the technical commission meeting. According to the interview with policy makers, farmers could receive a subsidy to obtain organic certification. If a farmer is approved by the Department of Agriculture, he/she can get a subsidy, which is 10 to 12 percent of the total cost of the organic certification. However, none of interviewed organic farmers knew about this. Thus the government should make more efforts to inform farmers about the subsidy, which may lead other farmers to consider organic production.

According to the interview with policy makers, the Department of Agriculture established a program called "Go Organic 2010" in 2001, and one of the main activities of this program was human resource development and knowledge dissemination. A goal of this program was to increase awareness of organic agriculture. As a part of a national campaign, several trainings, workshops, and seminars were conducted in various places in Indonesia. However, interviewed organic farmers mentioned that many people did not know about organic farming, and those people may not buy organic products. The

Department of Agriculture should reconsider the method of the national campaign to inform more people about organic agriculture.

Develop Markets for Organic Agricultural Products

According to the interviews with organic farmers in West Java, the most successful organic farmer in the study site sold his vegetables by home-delivery in Jakarta. He had about 120 individual home-delivery customers, and 75 percent of the customers were Japanese nationals living in Jakarta. He was able to do this by developing a Japanese Teikei system between him and the Japanese customers. Teikei are organic crop production, marketing and consumption activities, with a direct cooperative relationship between farmers and consumers to promote sustainable agriculture (Okumura, 2004). Concepts and activities of Teikei are similar to American community-supported agriculture systems (Hendersen and Van En, 1999). If the Teikei system is good fit with Indonesian culture, developing such a system between organic farmers and Indonesian consumers might be a good way to increase consumers' satisfaction, vis-à-vis farmers' income. To do so, organic farmers must be honest with consumers and grow "true" organic crops, even if they do not have organic certification.

Opportunities for Future Research

The organic movement is relatively new to Indonesia, thus there are opportunities for future research related to organic vegetable production in Indonesia from both social and economical points of view. The following list contains potential research, or a continuation of this study:

1. Conduct the same survey to the same respondents after several years to observe respondents' changes in awareness of, attitude toward, and adoption of target organic vegetable production practices.
2. Replicate the study using other organic vegetable production practices to confirm if this study's conceptual model will or will not work.
3. Replicate the study in other areas of Indonesia to confirm if this study's conceptual model will or will not work.
4. Replicate the study using other vegetables to confirm if this study's conceptual model will or will not work.
5. Perform a study in Jakarta to identify the factors associated with consumers' willingness to buy organic vegetables.
6. Perform qualitative studies to identify the reasons why farmers do or do not convert to organic farming in Indonesia.

Appendix A. DNBAF Project Pilot Farms' Summary

	West Java	**Bali**
Location of pilot farms	Dusun II, Sukagali village, Sub-district of Megamandung, District of Bogor	Banjar Titigalar, Bangli, village, Sub-district of Baturiti, District of Tabanang
Size		
Rice farm	70 are	0 are
Vegetable farm	20 are	20 are
When started?	January, 2005	January, 2005
Organic methods		
Application of bio-pesticides	√	√
Use of organic fertilizer	√	√
Crops		
Tomato	√	√
Potato		√
Cabbage	√	√
Carrot		√
Chili		√

Appendix B: Consent Forms

Research Consent Form

My name is Chifumi Takagi. I am a doctorate student at Michigan State University and I am conducting a study to learn about organic farming in Indonesia. I would like to ask you some questions about your vegetable productions and your opinions about organic farming. The information that you provide will be used to assess the effect of model farms on the dissemination of organic farming practices to farmers in Indonesia.

This study is supported by Bogor Agricultural University/Udayana University, in collaboration with Tokyo University of Agriculture in Japan.

The interview will take about an hour. Your participation is voluntary. Your refusal to participate or to withdraw the study carries no penalty or loss of any benefits. You are free to not answer any of questions that I will ask. However, I hope that you will agree to answer my questions, as your answers will help me to better understand about organic farming in Indonesia. All of the information that you provide will be kept confidential. This means that your answers will only seen by my advisor and me. No one will know your answer except my advisor and me. Your privacy will be protected by to the maximum extent allowable by law.

If you have any questions about this study, please contact Chifumi Takagi by phone: 1-517- 432-0296, e-mail: takagich@msu.edu, or regular mail: Department of Community, Agriculture, Recreation, and Resource Studies, Michigan State University, 131 Natural Resources Building, East Lansing, MI 48824-1222 USA. If you have any questions about your rights as a study participant, or are dissatisfied at any time with any aspect of this study, you may contact—anonymously, if you wish—Dr. Peter Vasilenko, Director, by phone:1-517- 355-2180, fax: 1-517-432-4503, e-mail: irb@msu.edu, or regular mail: 202 Olds Hall, Michigan State University, East Lansing, MI 48824-1046 USA.

Thank you very much for agrees to cooperation for this study.

I voluntarily participate in this study

______________________________ ____________________

Signature (Name) Date

Research Consent Form for Policy Maker of Organic Farming in Indonesia

My name is Chifumi Takagi. I am a doctorate student at Michigan State University and I am conducting a study to learn about organic agriculture in Indonesia. I would like to ask you some questions about organic agriculture, especially for vegetable in order to answer the question "what is the government doing to support organic agriculture?"

The information that you provide will be used to assess the effect of model farms on the dissemination of organic farming practices to farmers in Indonesia.

This study is supported by Bogor Agricultural University/Udayana University, in collaboration with Tokyo University of Agriculture in Japan.

The interview will take about 30 minutes. Your participation is voluntary. Your refusal to participate or to withdraw the study carries no penalty or loss of any benefits. You are free to not answer any of questions that I will ask. However, I hope that you will agree to answer my questions, as your answers will help me to better understand about organic farming in Indonesia. All of the information that you provide will be kept confidential. This means that your answers will only seen by my advisor and me. No one will know your answers except my advisor and me. Your privacy will be protected by to the maximum extent allowable by law.

If you have any questions about this study, please contact Chifumi Takagi by phone: 1-517- 432-0296, e-mail: takagich@msu.edu, or regular mail: Department of Community, Agriculture, Recreation, and Resource Studies, Michigan State University, 131 Natural Resources Building, East Lansing, MI 48824-1222 USA. If you have any questions about your rights as a study participant, or are dissatisfied at any time with any aspect of this study, you may contact—anonymously, if you wish—Dr. Peter Vasilenko, Director, by phone:1-517- 355-2180, fax: 1-517-432-4503, e-mail: irb@msu.edu, or regular mail: 202 Olds Hall, Michigan State University, East Lansing, MI 48824-1046 USA.

Thank you very much for agrees to cooperation for this study.

I voluntarily participate in this study

______________________________________ ____________________

Signature (Name) Date

Research Consent Form for Regional Extension Agents

My name is Chifumi Takagi. I am a doctorate student at Michigan State University and I am conducting a study to learn about organic farming in Indonesia. I would like to ask you some questions about the agricultural extension system in order to answer the question "What are the agricultural extension agents doing to support organic farming?"

The information that you provide will be used to assess the effect of model farms on the dissemination of organic farming practices to farmers in Indonesia.

This study is supported by Bogor Agricultural University/Udayana University, in collaboration with Tokyo University of Agriculture in Japan.

The interview will take about 30 minutes. Your participation is voluntary. Your refusal to participate or to withdraw the study carries no penalty or loss of any benefits. You are free to not answer any of questions that I will ask. However, I hope that you will agree to answer my questions, as your answers will help me to better understand about organic farming in Indonesia. All of the information that you provide will be kept confidential. This means that your answers will only seen by my advisor and me. No one will know your answer except my advisor and me. Your privacy will be protected by to the maximum extent allowable by law.

If you have any questions about this study, please contact Chifumi Takagi by phone: 1-517- 432-0296, e-mail: takagich@msu.edu, or regular mail: Department of Community, Agriculture, Recreation, and Resource Studies, Michigan State University, 131 Natural Resources Building, East Lansing, MI 48824-1222 USA. If you have any questions about your rights as a study participant, or are dissatisfied at any time with any aspect of this study, you may contact—anonymously, if you wish—Dr. Peter Vasilenko, Director, by phone:1-517- 355-2180, fax: 1-517-432-4503, e-mail: irb@msu.edu, or regular mail: 202 Olds Hall, Michigan State University, East Lansing, MI 48824-1046 USA.

Thank you very much for agrees to cooperation for this study.

I voluntarily participate in this study

________________________________ ____________________

Signature (Name) Date

Research Consent Form for Marketing People of Organic Vegetables

My name is Chifumi Takagi. I am a doctorate student at Michigan State University and I am conducting a study to learn about organic farming in Indonesia. I would like to ask you some questions about the organic vegetable marketing system in order to answer the question "What are organic vegetable marketing channels and what are the issues and problems to sell organic vegetables in Indonesia?"

The information that you provide will be used to assess the effect of model farms on the dissemination of organic farming practices to farmers in Indonesia.

This study is supported by Bogor Agricultural University/Udayana University, in collaboration with Tokyo University of Agriculture in Japan.

The interview will take about 30 minutes. Your participation is voluntary. Your refusal to participate or to withdraw the study carries no penalty or loss of any benefits. You are free to not answer any of questions that I will ask. However, I hope that you will agree to answer my questions, as your answers will help me to better understand about organic farming in Indonesia. All of the information that you provide will be kept confidential. This means that your answers will only seen by my advisor and me. No one will know your answers except my advisor and me. Your privacy will be protected by to the maximum extent allowable by law.

If you have any questions about this study, please contact Chifumi Takagi by phone: 1-517- 432-0296, e-mail: takagich@msu.edu, or regular mail: Department of Community, Agriculture, Recreation, and Resource Studies, Michigan State University, 131 Natural Resources Building, East Lansing, MI 48824-1222 USA. If you have any questions about your rights as a study participant, or are dissatisfied at any time with any aspect of this study, you may contact—anonymously, if you wish—Dr. Peter Vasilenko, Director, by phone:1-517- 355-2180, fax: 1-517-432-4503, e-mail: irb@msu.edu, or regular mail: 202 Olds Hall, Michigan State University, East Lansing, MI 48824-1046 USA.

Thank you very much for agrees to cooperation for this study.

I voluntarily participate in this study

________________________________ __________________

Signature (Name) Date

Appendix C: Research Instruments

Adoption of Organic Vegetable Production Practices in Indonesia

(Questionnaire)

This survey is part of Chifumi Takagi's dissertation project designed to evaluate vegetable farmers' perceptions of organic agriculture. The survey results will be used for research purposes only.

Circle West Java Bali

Respondent ID:__________

Survey date and time:___________________________

1. How many m^2 of farmland do you have? __________ m^2

2. Among the farmland, how many m^2 do you use for vegetable production? __________ m^2

3. What vegetables do you grow?

1. Cabbage 2. Tomato 3. Carrot 4. Chili 5. Chinese cabbage 6. *Pakcoy* 7. *Cesin* 8. Beans 9. Other:____________________

4. Have you ever heard the word "organic farming" or "organic agriculture"? Yes No

5. Please describe your understanding of organic farming: ____

____

6. Please let me know your vegetable production in last 12 months.

Months / Land												
Plot A(m^2) Irrigation source:												
1.Own 2. Rent 3. *Garap Tanah Negara* 4. *Garap tanah milik orang lain* If 2-4, how much the rent/tax? (Rp/ha/year)												
Plot B (m^2) Irrigation source:												

1.Own 2. Rent 3. *Garap Tanah Negara* 4. *Garap tanah milik orang lain* If 2-4, how much the rent/tax? (Rp/ha/year)												
Plot C (m^2) Irrigation Source:												
1.Own 2. Rent 3. *Garap Tanah Negara* 4. *Garap tanah milik orang lain* If 2-4, how much the rent/tax? (Rp/ha/year)												

Definition of Terms

▶**Organic farming**: Holistic production management systems which promote and enhance agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity. It emphasizes the use of management practices in preference to the use of off-farm inputs, taking into account that regional conditions require locally adapted systems. This is accomplished by using, where possible, cultural, biological and mechanical methods, as opposed to using synthetic materials, to fulfill any specific function within the system. The principal rules of organic farming are that natural inputs are approved and synthetic inputs are prohibite

SECTION 1: Vegetable Production and **Marketing**

Cabbage

	7. Which cabbage varieties did you plant? (Variety Name)	**8.** How many seedlings did you plant? (Quantity)	**9.** Seedlings Cost **OR**	
			What price did you pay? (Price per unit: Rp)	How much money did you spend? (Total cost: Rp)
Season 1				
Season 2				
Season 3				
Season 4				

		10. Which fertilizers did you apply to your cabbage crops? (Fertilizer Name)	**11.** Were they synthetic or organic?	**12.** How much of each fertilizer did you apply? (Quantity)	**13.** Fertilizer Cost <u>**OR**</u>	
					What price did you pay? (Price per unit: Rp)	How much money did you spend? (Total cost: Rp)
Season 1	Plot A		Synthetic Organic			
			Synthetic Organic			
	Plot B		Synthetic Organic			
			Synthetic Organic			
	Plot C		Synthetic Organic			
			Synthetic Organic			
Season 2	Plot A		Synthetic Organic			
			Synthetic Organic			
	Plot B		Synthetic Organic			
			Synthetic Organic			
	Plot C		Synthetic Organic			
			Synthetic Organic			
Season 3	Plot A		Synthetic Organic			
			Synthetic Organic			
	Plot B		Synthetic Organic			
			Synthetic Organic			
	Plot C		Synthetic Organic			

			Synthetic Organic			
Season 4	Plot A		Synthetic Organic			
			Synthetic Organic			
	Plot B		Synthetic Organic			
			Synthetic Organic			
	Plot C		Synthetic Organic			
			Synthetic Organic			

		14. Which pesticides did you apply to your cabbage crops? (Pesticide Name)	**15.** Were they synthetic or organic?	**16.** How much of each pesticide did you apply? (Quantity)	**17.** Pesticide Cost **OR**	
					What price did you pay? (Price per unit: Rp)	How much money did you spend? (Total cost: Rp)
Season 1	Plot A		Synthetic Organic			
			Synthetic Organic			
	Plot B		Synthetic Organic			
			Synthetic Organic			
	Plot C		Synthetic Organic			
			Synthetic Organic			
Season 2	Plot A		Synthetic Organic			
			Synthetic Organic			
	Plot B		Synthetic Organic			
			Synthetic Organic			
	Plot C		Synthetic Organic			
			Synthetic Organic			
Season 3	Plot A		Synthetic Organic			
			Synthetic Organic			
	Plot B		Synthetic Organic			
			Synthetic Organic			

	Plot C		Synthetic Organic			
			Synthetic Organic			
Season 4	Plot A		Synthetic Organic			
			Synthetic Organic			
	Plot B		Synthetic Organic			
			Synthetic Organic			
	Plot C		Synthetic Organic			
			Synthetic Organic			

		Labor	**18.** How many people were employed in your cabbage-growing operation? (Number)	**19.** For how many total days? (Working days)	**20.** At what daily wage? (Daily Wage: Rp)
Season 1	Plot A	Male employees			
		Female employees			
	Plot B	Male employees			
		Female employees			
	Plot C	Male employees			
		Female employees			
Season 2	Plot A	Male employees			
		Female employees			
	Plot B	Male employees			
		Female employees			
	Plot C	Male employees			
		Female employees			
Season 3	Plot A	Male employees			
		Female employees			
	Plot B	Male employees			
		Female employees			
	Plot C	Male employees			
		Female employees			
Season	Plot A	Male employees			

4		Female employees			
	Plot B	Male employees			
		Female employees			
	Plot C	Male employees			
		Female employees			

		21. What other materials did you use in your cabbage-growing operation? (Material Name)	**22.** How much of each material did you use? (Quantity)	**23.** Other Material Cost **OR**	
				What price did you pay? (Price per unit: Rp)	How much money did you spend? (Total cost: Rp)
Season 1	Plot A				
	Plot B				
	Plot C				
Season 2	Plot A				
	Plot B				
	Plot C				
Season 3	Plot A				
	Plot B				
	Plot C				

Season 4	Plot A				
	Plot B				
	Plot C				

	24. Who did you sell your cabbage to?	**25.** Must you grade your cabbage?	**26.** What method did you use to sell your cabbage? *(choose one)* 1 = Individually 2 = By farmers' group 3 = By cooperation with other farmers 4 = Contract *5 = Borongan* 6 = Other (Specify)	**27.** How much did it cost for transportation? (Transportation costs: Rp)	**28.** How much did it cost for packaging? (Packaging costs: Rp)	**29.** How much did it cost for others? (Other costs: Rp)
Season 1		Yes No				
		Yes No				
		Yes No				
Season 2		Yes No				
		Yes No				
		Yes No				
Season 3		Yes No				
		Yes No				
		Yes No				
Season 4		Yes No				
		Yes No				
		Yes No				

		30. How many kilograms of cabbage did you harvest?	**31.** What price per kilogram were you typically able to get when you sell your cabbage? (Rp/kg)
Season 1	Plot A		
	Plot B		
	Plot C		
Season 2	Plot A		
	Plot B		
	Plot C		
Season 3	Plot A		
	Plot B		
	Plot C		
Season 4	Plot A		
	Plot B		
	Plot C		

32. If you needed money for cabbage production, can you get a loan? Yes No

If Yes, where did you get the loan?

1. Relative 2. Bank 3. Farmers' organization 4. Other:_________

How much the interest rate per month? _______%

Tomato

	33. Which tomato varieties did you plant? (Variety Name)	**34.** How many seedlings did you plant? (Quantity)	**35.** Seedlings Cost **OR**	
			What price did you pay? (Price per unit: Rp)	How much money did you spend? (Total cost: Rp)
Season 1				
Season 2				
Season 3				
Season 4				

		36. Which fertilizers did you apply to your tomato crops? (Fertilizer Name)	**37.** Were they synthetic or organic?	**38.** How much of each fertilizer did you apply? (Quantity)	**39.** Fertilizer Cost **OR**	
					What price did you pay? (Price per unit: Rp)	How much money did you spend? (Total cost: Rp)
Season 1	Plot A		Synthetic Organic			
			Synthetic Organic			
	Plot B		Synthetic Organic			
			Synthetic Organic			
	Plot C		Synthetic Organic			
			Synthetic Organic			
Season 2	Plot A		Synthetic Organic			
			Synthetic Organic			
	Plot B		Synthetic Organic			
			Synthetic Organic			
	Plot C		Synthetic Organic			
			Synthetic Organic			
Season 3	Plot A		Synthetic Organic			
			Synthetic Organic			
	Plot B		Synthetic Organic			
			Synthetic Organic			
	Plot C		Synthetic Organic			

			Synthetic Organic			
Season 4	Plot A		Synthetic Organic			
			Synthetic Organic			
	Plot B		Synthetic Organic			
			Synthetic Organic			
	Plot C		Synthetic Organic			
			Synthetic Organic			

		40. Which pesticides did you apply to your tomato crops? (Pesticide Name)	**41.** Were they synthetic or organic?	**42.** How much of each pesticide did you apply? (Quantity)	**43.** Pesticide Cost **OR**	
					What price did you pay? (Price per unit: Rp)	How much money did you spend? (Total cost: Rp)
Season 1	Plot A		Synthetic Organic			
			Synthetic Organic			
	Plot B		Synthetic Organic			
			Synthetic Organic			
	Plot C		Synthetic Organic			
			Synthetic Organic			
Season 2	Plot A		Synthetic Organic			
			Synthetic Organic			
	Plot B		Synthetic Organic			
			Synthetic Organic			
	Plot C		Synthetic Organic			
			Synthetic Organic			
Season 3	Plot A		Synthetic Organic			
			Synthetic Organic			
	Plot B		Synthetic Organic			
			Synthetic Organic			

	Plot C		Synthetic Organic			
			Synthetic Organic			
Season 4	Plot A		Synthetic Organic			
			Synthetic Organic			
	Plot B		Synthetic Organic			
			Synthetic Organic			
	Plot C		Synthetic Organic			
			Synthetic Organic			

		Labor	**44.** How many people were employed in your tomato-growing operation? (Number)	**45.** For how many total days? (Working days)	**46.** At what daily wage? (Daily Wage: Rp)
Season 1	Plot A	Male employees			
		Female employees			
	Plot B	Male employees			
		Female employees			
	Plot C	Male employees			
		Female employees			
Season 2	Plot A	Male employees			
		Female employees			
	Plot B	Male employees			
		Female employees			
	Plot C	Male employees			
		Female employees			
Season 3	Plot A	Male employees			
		Female employees			
	Plot B	Male employees			
		Female employees			
	Plot C	Male employees			
		Female employees			
Season	Plot A	Male employees			

4		Female employees			
	Plot B	Male employees			
		Female employees			
	Plot C	Male employees			
		Female employees			

		47. What other materials did you use in your tomato-growing operation? (Material Name)	**48.** How much of each material did you use? (Quantity)	**49.** Other Material Cost	
				What price did you pay? (Price per unit: Rp)	**OR** How much money did you spend? (Total cost: Rp)
Season 1	Plot A				
	Plot B				
	Plot C				
Season 2	Plot A				
	Plot B				
	Plot C				
Season 3	Plot A				
	Plot B				
	Plot C				

Season 4	Plot A				
	Plot B				
	Plot C				

	50. Who did you sell your tomato to?	**51.** Must you grade your tomato?	**52.** What method did you use to sell your tomato? *(choose one)* 1 = Individually 2 = By farmers' group 3 = By cooperation with other farmers 4 = Contract *5 = Borongan* 6 = Other (Specify)	**53.** How much did it cost for transportation? (Transportation costs: Rp)	**54.** How much did it cost for packaging? (Packaging costs: Rp)	**55.** How much did it cost for others? (Other costs: Rp)
Season 1		Yes No				
		Yes No				
		Yes No				
Season 2		Yes No				
		Yes No				
		Yes No				
Season 3		Yes No				
		Yes No				
		Yes No				
Season 4		Yes No				
		Yes No				
		Yes No				

		56. How many kilograms of tomato did you harvest?	**57.** What price per kilogram were you typically able to get when you sell your tomato? (Rp/kg)
Season 1	Plot A		
	Plot B		
	Plot C		
Season 2	Plot A		
	Plot B		
	Plot C		
Season 3	Plot A		
	Plot B		
	Plot C		
Season 4	Plot A		
	Plot B		
	Plot C		

58. If you needed money for tomato production, can you get a loan? Yes No

If Yes, where did you get the loan?

2. Relative 2. Bank 3. Farmers' organization 4. Other:_________

How much the interest rate per month? _______%

Carrot

	59. Which carrot varieties did you plant? (Variety Name)	**60.** How many seedlings did you plant? (Quantity)	**61.** Seedlings Cost **OR**	
			What price did you pay? (Price per unit: Rp)	How much money did you spend? (Total cost: Rp)
Season 1				
Season 2				
Season 3				
Season 4				

		62. Which fertilizers did you apply to your carrot crops? (Fertilizer Name)	**63.** Were they synthetic or organic?	**64.** How much of each fertilizer did you apply? (Quantity)	**65.** Fertilizer Cost **OR**	
					What price did you pay? (Price per unit: Rp)	How much money did you spend? (Total cost: Rp)
Season 1	Plot A		Synthetic Organic			
			Synthetic Organic			
	Plot B		Synthetic Organic			
			Synthetic Organic			
	Plot C		Synthetic Organic			
			Synthetic Organic			
Season 2	Plot A		Synthetic Organic			
			Synthetic Organic			
	Plot B		Synthetic Organic			
			Synthetic Organic			
	Plot C		Synthetic Organic			
			Synthetic Organic			
Season 3	Plot A		Synthetic Organic			
			Synthetic Organic			
	Plot B		Synthetic Organic			
			Synthetic Organic			
	Plot C		Synthetic Organic			

			Synthetic Organic			
Season 4	Plot A		Synthetic Organic			
			Synthetic Organic			
	Plot B		Synthetic Organic			
			Synthetic Organic			
	Plot C		Synthetic Organic			
			Synthetic Organic			

		66. Which pesticides did you apply to your carrot crops? (Pesticide Name)	**67.** Were they synthetic or organic?	**68.** How much of each pesticide did you apply? (Quantity)	**69.** Pesticide Cost **OR**	
					What price did you pay? (Price per unit: Rp)	How much money did you spend? (Total cost: Rp)
Season 1	Plot A		Synthetic Organic			
			Synthetic Organic			
	Plot B		Synthetic Organic			
			Synthetic Organic			
	Plot C		Synthetic Organic			
			Synthetic Organic			
Season 2	Plot A		Synthetic Organic			
			Synthetic Organic			
	Plot B		Synthetic Organic			
			Synthetic Organic			
	Plot C		Synthetic Organic			
			Synthetic Organic			
Season 3	Plot A		Synthetic Organic			
			Synthetic Organic			
	Plot B		Synthetic Organic			
			Synthetic Organic			

	Plot C		Synthetic Organic			
			Synthetic Organic			
Season 4	Plot A		Synthetic Organic			
			Synthetic Organic			
	Plot B		Synthetic Organic			
			Synthetic Organic			
	Plot C		Synthetic Organic			
			Synthetic Organic			

		Labor	**70.** How many people were employed in your carrot-growing operation? (Number)	**71.** For how many total days? (Working days)	**72.** At what daily wage? (Daily Wage: Rp)
Season 1	Plot A	Male employees			
		Female employees			
	Plot B	Male employees			
		Female employees			
	Plot C	Male employees			
		Female employees			
Season 2	Plot A	Male employees			
		Female employees			
	Plot B	Male employees			
		Female employees			
	Plot C	Male employees			
		Female employees			
Season 3	Plot A	Male employees			
		Female employees			
	Plot B	Male employees			
		Female employees			
	Plot C	Male employees			
		Female employees			
Season	Plot A	Male employees			

4		Female employees			
	Plot B	Male employees			
		Female employees			
	Plot C	Male employees			
		Female employees			

Season	Plot	**73.** What other materials did you use in your carrot-growing operation? (Material Name)	**74.** How much of each material did you use? (Quantity)	**75.** Other Material Cost: What price did you pay? (Price per unit: Rp)	**OR** How much money did you spend? (Total cost: Rp)
Season 1	Plot A				
	Plot B				
	Plot C				
Season 2	Plot A				
	Plot B				
	Plot C				
Season 3	Plot A				
	Plot B				
	Plot C				

Season 4	Plot A				
	Plot B				
	Plot C				

	76. Who did you sell your carrot to?	**77.** Must you grade your carrot?	**78.** What method did you use to sell your carrot? *(choose one)* 1 = Individually 2 = By farmers' group 3 = By cooperation with other farmers 4 = Contract *5 = Borongan* 6 = Other (Specify)	**79.** How much did it cost for transportation? (Transportation costs: Rp)	**80.** How much did it cost for packaging? (Packaging costs: Rp)	**81.** How much did it cost for others? (Other costs: Rp)
Season 1		Yes No				
		Yes No				
		Yes No				
Season 2		Yes No				
		Yes No				
		Yes No				
Season 3		Yes No				
		Yes No				
		Yes No				
Season 4		Yes No				
		Yes No				
		Yes No				

		82. How many kilograms of carrot did you harvest?	**83.** What price per kilogram were you typically able to get when you sell your carrot? (Rp/kg)
Season 1	Plot A		
	Plot B		
	Plot C		
Season 2	Plot A		
	Plot B		
	Plot C		
Season 3	Plot A		
	Plot B		
	Plot C		
Season 4	Plot A		
	Plot B		
	Plot C		

84. If you needed money for carrot production, can you get a loan? Yes No

If Yes, where did you get the loan?

3. Relative 2. Bank 3. Farmers' organization 4. Other:_________

How much the interest rate per month? _______%

SECTION 2: Exposure of the DENBAF project pilot farms

	If YES, check the column
85. Have you ever heard about the DENBAF project pilot farm?	
86. Have you ever seen the pilot farm?	
87. Have you ever visited the pilot farm?	
88. Have you ever worked at the pilot farm?	
89. Have you ever talked with project people to learn about organic farming?	
Total number of the checks	

SECTION 3: Information Source

90. In the past year, have you gotten vegetable production information from any of the following sources?

	Check to all applicable	Please rank them (3 most important sources)
Radios		
TVs		
Magazines and journals		
Internet		
Extension agent		
NGOs		
Commercial companies		
Universities		
Farmers' groups		
Organic farmers		
Other farmers		
Other_____________		

SECTION 4: Awareness of Organic Vegetable Practices

	Very Familiar	Familiar	Somewhat familiar	Not familiar	Not at all familiar
91. How familiar are you with a word of bio-pesticide?	1	2	3	4	5
92. How familiar are you with raw materials for making bio-pesticides?	1	2	3	4	5
93. How familiar are you how to make bio-pesticides?	1	2	3	4	5
94. How familiar are you how to use bio-pesticides?	1	2	3	4	5
95. How familiar are you with a word of compost/bokashi?	1	2	3	4	5
96. How familiar are you with raw materials for making compost/bokashi?	1	2	3	4	5
97. How familiar are you how to make compost/bokashi?	1	2	3	4	5
98. How familiar are you how to use compost/bokashi?	1	2	3	4	5

Definition of Terms

Target organic methods

In this questionnaire, three farming methods are identified as **target organic methods** for cabbage production.

►**Application of bio-pesticides (plant extracts)**: Applying plant extract mixtures as a biological insecticide to avoid major insect pests on vegetables.

►**Use of organic fertilizer:** Using only organic fertilizer such as compost, cow dung, chicken manure, and "bokashi" that is one of composts fermented by microorganisms.

SECTION 5: Attitude toward the Organic Farming Methods

99. I will read several statements. Please listen them carefully and tell me if you disagree or agree about each statement. Let me start from question 99-a.

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
a	Organic farmers live more in harmony with nature than do conventional farmers.	1	2	3	4	5
b	Organic produce is healthier than conventionally grown produce.	1	2	3	4	5
c	It is possible to control weeds without using synthetic chemicals.	1	2	3	4	5

d	It is possible to control pests without using synthetic chemicals.	1	2	3	4	5
e	It is possible to control diseases without using synthetic chemicals.	1	2	3	4	5
f	Organic farms are more profitable than conventional ones.	1	2	3	4	5

100. I will read several statements. Please listen them carefully and tell me if you disagree or agree about each statement. Let me start from question 100-a.

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagre e
a	Using **plant extracts** to avoid insect pests can reduce production costs.	1	2	3	4	5
b	Using **only organic fertilizer** to grow vegetables can reduce production costs.	1	2	3	4	5
c	Using **plant extracts** to avoid insect pests is a good fit with my culture.	1	2	3	4	5
d	Using **plant extracts** to avoid insect pests is a good fit with my experience.	1	2	3	4	5
e	Using **only organic fertilizer** to grow cabbages is a good fit with my culture.	1	2	3	4	5

f	Using **only organic fertilizer** to grow cabbages is a good fit with my experience.	1	2	3	4	5
g	Using **Plant extracts** to avoid pests is easy.	1	2	3	4	5
h	Using **only organic fertilizer** to grow vegetables is easy.	1	2	3	4	5
i	It can be tested to use **plant extracts** to avoid insect pests in a small part of my field.	1	2	3	4	5
j	It can be tested to use **only organic fertilizer** to grow vegetables in a small part of my field.	1	2	3	4	5
k	People can see a difference between vegetables grown using **plant extracts** and vegetables grown using synthetic insecticide to avoid insect pests easily.	1	2	3	4	5
l	People can see a difference between vegetables grown using **only organic fertilizer** and vegetables grown using synthetic fertilizer easily.	1	2	3	4	5

SECTION 6: Intention of Organic Conversion

	Cabbage		Tomato		Carrot	
101. In past year, have you already adopted to use **only organic fertilizer**?	Yes	No	Yes	No	Yes	No
If YES, when?						

If Not, why?____

If your answer is NO, how likely will you to convert to organic farming methods for each target vegetable?

	I will likely convert	I may convert	I am not sure	I may not convert	I will unlikely not convert
I intend to adopt to use **only organic fertilizer** for **cabbage** production?	1	2	3	4	5
I intend to adopt to use **only organic fertilizer** for **tomato** production?	1	2	3	4	5
I intend to adopt to use **only organic fertilizer** for **carrot** production?	1	2	3	4	5

If NO, why?____

	Cabbage		Tomato		Carrot	
102. In past year, have you already adopted to use **plant extracts**?	Yes	No	Yes	No	Yes	No
If YES, when?						

If No, why?______________________________

If No, how likely will you to convert to organic farming methods for each target vegetable?

	I will likely convert	I may convert	I am not sure	I may not convert	I will unlikely not convert
I intend to adopt to use **plant extracts** for **cabbage** production?	1	2	3	4	5
I intend to adopt to use **plant extracts** for **tomato** production?	1	2	3	4	5
I intend to adopt to use **plant extracts** for **carrot** production?	1	2	3	4	5

If NO, why?______________________________

SECTION 7: Background Information

Please give the information on education and occupation of your family members and yourself.						
103. Name	**104.** Gender 1=Male 2=Female	**105.** Age	**106.** Relationship with household head	**107.** Educational level 1. No school 2. Some primary school 3. Completed primary school 4. Some junior high school 5. Completed junior high school 6. Some high school 7. Completed high school 8. Some college or university 9. Completed college or university	**108.** Current occupation 1. Farming (Full time) 2. Farming (Part time) 3. Private company 4. Public servant 5. Peddler/sales 6. Construction worker 7. Others	If current occupation is farming, how long have been farming in your farm?
			Household head			

109. How far from your house to the pilot farm? ____________km

Thank you very much for your time!!

Adoption of Organic Vegetable Production Practices in Indonesia

(Questionnaire)

This survey is part of Chifumi Takagi's dissertation project designed to evaluate vegetable farmers' perceptions of organic agriculture. The survey results will be used for research purposes only.

Circle Java Barat Bali

Respondent ID:__________

Survey date and time:____________________________

1. Berapa luas lahan usahatani total yang dimiliki? __________ m^2

2. Berapa luas lahan usahatani sayuran? __________ m^2

3. Apa saja sayur-sayuran yang bapak tanam?

1.Kol 2. Tomat 3. Wortel 4. Cabe 5. Sawi 6. Pakcoy 7. *Cesin* 8. Kacan9. Lainnya:____________________

4. Apakah bapak pernah dengar "tanaman organik" atau "pertanian organic"? Ya Tidak

5. Tolong jelaskan tanaman organic menurut bapak: ____

____

6. Tolong beritahu prodaksi sayuran bapak dalam 12 bulan terakhir.

Bulan / Tana												
Lokasi A (m^2) Sumber irigasi:												
1.milik sendri 2. sews 3. *Garap Tanah Negara* 4. *Garap tanah milik orang lain* Kalau 2-4, berapa harganya? (Rp/ha/tahun)												
Lokasi B (m^2) Sumber irigasi:												

1.milik sendri 2. sews 3. *Garap Tanah Negara* 4. *Garap tanah milik orang lain* Kalau 2-4, berapa harganya? (Rp/ha/tahun)												
Lokasi C (m^2) Sumber irigasi:												
1.milik sendri 2. sews 3. *Garap Tanah Negara* 4. *Garap tanah milik orang lain* Kalau 2-4, berapa harganya? (Rp/ha/tahun)												

Definisi Istilah Teknis

►**Organik Pertanian**: Pedoman yang didasarkan pada hubungan antara organisme dengan alam sekitarna dan hubungan antara organisme itu sendiri secara seimbang. Artinya pola hubungan antara organisme denan alamnya dipandang sebagai satu kesatuan yang tidak terposahkan, Pola hubungan ini digunakan sebagai pedoman atau hukum dasar dalam pengeolaan alam, termasuk pertanian di dalamnya. Aturan yang penting untuk organik pertanian adalah pakai pupuk dan obat yang dari alami bukan yang kimia.

SECTION 1: Vegetable Production and Marketing

Kol

	7. Kol varitas apa yang bapak tanam? (Nama Varitas)	**8.** Berapa jumlah bibit yang bapak tanam? (Kuantitas)	**9.** Biaya bibit **atau**	
			Berapa harga bibit per unit? (harga per unit: Rp)	Berapa biaya total yang di keluarkan? (Total cost: Rp)
Musim panen 1				
Musim panen 2				
Musim panen 3				
Musim panen 4				

		10. Jenis pupuk apa yang digunakan untuk tanaman kol bapak? (Nama Pupuk)	**11.** Apakah pupuk kimia atau organic?	**12.** Berapa banyak untuk masing- masing pupuk yang digunakan? (Kuantitas— kg)	**13.** Biaya pupuk	
					Berapa biaya yang bapak keluarkan? (Harga per unit: Rp)	**atau** Berapa biaya total untuk pupuk yang bapak keluarkan? (Harga jumlah: Rp)
Musimu panen 1	Lokasi A		Kimia Organik			
			Kimia Organik			
	Lokasi B		Kimia Organik			
			Kimia Organik			
	Lokasi C		Kimia Organik			
			Kimia Organik			
Musimu panen 2	Lokasi A		Kimia Organik			
			Kimia Organik			
	Lokasi B		Kimia Organik			
			Kimia Organik			
	Lokasi C		Kimia Organik			
			Kimia Organik			
Musimu panen 3	Lokasi A		Kimia Organik			
			Kimia Organik			

	Lokasi B		Kimia Organik			
			Kimia Organik			
	Lokasi C		Kimia Organik			
			Kimia Organik			
Musimu panen 4	Lokasi A		Kimia Organik			
			Kimia Organik			
	Lokasi B		Kimia Organik			
			Kimia Organik			
	Lokasi C		Kimia Organik			
			Kimia Organik			

		14. Jenis pestisida apa yang digunakan untuk tanaman kol bapak? (Nama Pestisida)	**15.** Apakah pestisida kimia atau organic?	**16.** Berapa banyak untuk masing- masing pestisida yang digunakan? (Kuantitas— kg)	**17.** Biaya Pestisida **OR**	
					Berapa biaya yang bapak keluarkan? (Harga per unit: Rp)	Berapa biaya total untuk pupuk yang bapak keluarkan? (Harga jumulah: Rp)
Musimu panen 1	Lokasi A		Kimia Organik			
			Kimia Organik			
	Lokasi B		Kimia Organik			
			Kimia Organik			
	Lokasi C		Kimia Organik			
			Kimia Organik			
Musimu panen 2	Lokasi A		Kimia Organik			
			Kimia Organik			
	Lokasi B		Kimia Organik			
			Kimia Organik			
	Lokasi C		Kimia Organik			
			Kimia Organik			
Musimu panen 3	Lokasi A		Kimia Organik			
			Kimia Organik			

	Lokasi B		Kimia Organik			
			Kimia Organik			
	Lokasi C		Kimia Organik			
			Kimia Organik			
Musimu panen 4	Lokasi A		Kimia Organik			
			Kimia Organik			
	Lokasi B		Kimia Organik			
			Kimia Organik			
	Lokasi C		Kimia Organik			
			Kimia Organik			

		Tenaga kerja	**18.** Berapa orang yang bekerja di tanah bapak untuk prodaksi kol? (Nomol)	**19.** Berapa lama mereka bekerja sejak tanam sampai panen? (Hari kerja)	**20.** Berapa upah kerja per hari? (Gaji sehari: Rp)
Musimu panen 1	Lokasi A	Tenaga kerja pria			
		Tenaga kerja wanita			
	Lokasi B	Tenaga kerja pria			
		Tenaga kerja wanita			
	Lokasi C	Tenaga kerja pria			
		Tenaga kerja wanita			
Musimu panen 2	Lokasi A	Tenaga kerja pria			
		Tenaga kerja wanita			
	Lokasi B	Tenaga kerja pria			
		Tenaga kerja wanita			
	Lokasi C	Tenaga kerja pria			
		Tenaga kerja wanita			
Musimu panen 3	Lokasi A	Tenaga kerja pria			
		Tenaga kerja wanita			
	Lokasi B	Tenaga kerja pria			
		Tenaga kerja wanita			
	Lokasi C	Tenaga kerja pria			
		Tenaga kerja wanita			
Musimu	Lokasi A	Tenaga kerja pria			

panen 4		Tenaga kerja wanita			
	Lokasi B	Tenaga kerja pria			
		Tenaga kerja wanita			
	Lokasi C	Tenaga kerja pria			
		Tenaga kerja wanita			

		21. Bahan yang lainya yang bapak gunakan di tanah bapak untuk produksi kol? (plastic, bambu Dll)	**22.** Berapa banyaknya untuk masing-masing? (Quantity)	**23**. Biaya bahan yang lain **atau**	
				Berapa biayanya yang bapak keluarkan? (Harga per unit: Rp)	Berapa total biayanya? (Harga jumulah: Rp)
Musimu panen 1	Lokasi A				
	Lokasi B				
	Lokasi C				
Musimu panen 2	Lokasi A				
	Lokasi B				
	Lokasi C				
Musimu panen 3	Lokasi A				
	Lokasi B				
	Lokasi C				

Musimu panen 4	Lokasi A				
	Lokasi B				
	Lokasi C				

	24. Kepada siapa bapak menjual hasil kol bapak?	**25.** Apakah bapak harus menyeleksi berdasarkan grade?	**26.** Bagaimana caranya bapak menjual hasil tanaman? *(pilih sara satu)* 1 = perorangan 2 = dengan kolompok tani 3 = kerja sama dengan petani lain 4 = Kontrak *5 = Tebasan* *6 = Borongan* 7 = Lain (jelaskan)	**27.** Berapa biaya transportasinya? (biaya transportatasi: Rp)	**28.** Berapa biaya untuk pengemasan? (biaya pengemasan: Rp)	**29.** Berapa biaya yang lainya? (biaya yang lain: Rp)
Musim panen 1		Ya Tidak				
		Ya Tidak				
		Ya Tidak				
Musim panen 2		Ya Tidak				
		Ya Tidak				
		Ya Tidak				
Musim panen 3		Ya Tidak				
		Ya Tidak				
		Ya Tidak				
Musim panen 4		Ya Tidak				
		Ya Tidak				
		Ya Tidak				

		30. Berapa kilogram kol yang dipanen?	**31.** Berapa rata-rata harga jual kol per kilogram waktu panen? (Rp/kg)
Musim panen 1	Lokasi A		
	Lokasi B		
	Lokasi C		
Musim panen 2	Lokasi A		
	Lokasi B		
	Lokasi C		
Musim panen 3	Lokasi A		
	Lokasi B		
	Lokasi C		
Musim panen 4	Lokasi A		
	Lokasi B		
	Lokasi C		

32. Jika bapak memerlukan uang untuk menproduksi kol, apakah bapak bias mendapatkah pinjaman? Ya Tidak

Jika Ya, dimana bapak pinjam?

1. Saudara 2. Bank 3. KUD 4. Lainnya:_________

Berapa bunganya per bulan? _______%

Tomat

	33. Tomat varitas apa yang bapak tanam? (Nama Varitas)	**34.** Berapa jumlah bibit yang bapak tanam? (Kuantitas)	**35.** Biaya bibit **atau**	
			Berapa harga bibit per unit? (harga per unit: Rp)	Berapa biaya total yang di keluarkan? (Total cost: Rp)
Musim panen 1				
Musim panen 2				
Musim panen 3				
Musim panen 4				

		36. Jenis pupuk apa yang digunakan untuk tanaman tomat bapak? (Nama Pupuk)	**37.** Apakah pupuk kimia atau organic?	**38.** Berapa banyak untuk masing- masing pupuk yang digunakan? (Kuantitas— kg)	**39.** Biaya pupuk **atau**	
					Berapa biaya yang bapak keluarkan? (Harga per unit: Rp)	Berapa biaya total untuk pupuk yang bapak keluarkan? (Harga jumulah: Rp)
Musimu panen 1	Lokasi A		Kimia Organik			
			Kimia Organik			
	Lokasi B		Kimia Organik			
			Kimia Organik			
	Lokasi C		Kimia Organik			
			Kimia Organik			
Musimu panen 2	Lokasi A		Kimia Organik			
			Kimia Organik			
	Lokasi B		Kimia Organik			
			Kimia Organik			
	Lokasi C		Kimia Organik			
			Kimia Organik			
Musimu panen 3	Lokasi A		Kimia Organik			
			Kimia Organik			

	Lokasi B		Kimia Organik			
			Kimia Organik			
	Lokasi C		Kimia Organik			
			Kimia Organik			
Musimu panen 4	Lokasi A		Kimia Organik			
			Kimia Organik			
	Lokasi B		Kimia Organik			
			Kimia Organik			
	Lokasi C		Kimia Organik			
			Kimia Organik			

		40. Jenis pestisida apa yang digunakan untuk tanaman tomat bapak? (Nama Pestisida)	**41.** Apakah pestisida kimia atau organic?	**42.** Berapa banyak untuk masing- masing pestisida yang digunakan? (Kuantitas— kg)	**43.** Biaya Pestisida **OR**	
					Berapa biaya yang bapak keluarkan? (Harga per unit: Rp)	Berapa biaya total untuk pupuk yang bapak keluarkan? (Harga jumulah: Rp)
Musimu panen 1	Lokasi A		Kimia Organik			
			Kimia Organik			
	Lokasi B		Kimia Organik			
			Kimia Organik			
	Lokasi C		Kimia Organik			
			Kimia Organik			
Musimu panen 2	Lokasi A		Kimia Organik			
			Kimia Organik			
	Lokasi B		Kimia Organik			
			Kimia Organik			
	Lokasi C		Kimia Organik			
			Kimia Organik			
Musimu panen 3	Lokasi A		Kimia Organik			
			Kimia Organik			

	Lokasi B		Kimia Organik			
			Kimia Organik			
	Lokasi C		Kimia Organik			
			Kimia Organik			
Musimu panen 4	Lokasi A		Kimia Organik			
			Kimia Organik			
	Lokasi B		Kimia Organik			
			Kimia Organik			
	Lokasi C		Kimia Organik			
			Kimia Organik			

		Tenaga kerja	**44.** Berapa orang yang bekerja di tanah bapak untuk prodaksi tomat? (Nomol)	**45.** Berapa lama mereka bekerja sejak tanam sampai panen? (Hari kerja)	**46.** Berapa upah kerja per hari? (Gaji sehari: Rp)
Musimu panen 1	Lokasi A	Tenaga kerja pria			
		Tenaga kerja wanita			
	Lokasi B	Tenaga kerja pria			
		Tenaga kerja wanita			
	Lokasi C	Tenaga kerja pria			
		Tenaga kerja wanita			
Musimu panen 2	Lokasi A	Tenaga kerja pria			
		Tenaga kerja wanita			
	Lokasi B	Tenaga kerja pria			
		Tenaga kerja wanita			
	Lokasi C	Tenaga kerja pria			
		Tenaga kerja wanita			
Musimu panen 3	Lokasi A	Tenaga kerja pria			
		Tenaga kerja wanita			
	Lokasi B	Tenaga kerja pria			
		Tenaga kerja wanita			
	Lokasi C	Tenaga kerja pria			
		Tenaga kerja wanita			
Musimu	Lokasi A	Tenaga kerja pria			

panen 4		Tenaga kerja wanita			
	Lokasi B	Tenaga kerja pria			
		Tenaga kerja wanita			
	Lokasi C	Tenaga kerja pria			
		Tenaga kerja wanita			

		47. Bahan yang lainya yang bapak gunakan di tanah bapak untuk produksi tomat? (plastic, bambu Dll)	**48.** Berapa banyaknya untuk masing-masing? (Quantity)	**49.** Biaya bahan yang lain **atau**	
				Berapa biayanya yang bapak keluarkan? (Harga per unit: Rp)	Berapa total biayanya? (Harga jumulah: Rp)
Musimu panen 1	Lokasi A				
	Lokasi B				
	Lokasi C				
Musimu panen 2	Lokasi A				
	Lokasi B				
	Lokasi C				
Musimu panen 3	Lokasi A				
	Lokasi B				
	Lokasi C				

Musimu panen 4	Lokasi A				
	Lokasi B				
	Lokasi C				

	50. Kepada siapa bapak menjual hasil tomat bapak?	**51.** Apakah bapak harus menyeleksi berdasarkan grade?	**52.** Bagaimana caranya bapak menjual hasil tanaman? *(pilih sara satu)* 1 = perorangan 2 = dengan kolompok tani 3 = kerja sama dengan petani lain 4 = Kontrak *5 = Tebasan* *6 = Borongan* 7 = Lain (jelaskan)	**53.** Berapa biaya transportasinya? (biaya transportatasi: Rp)	**54.** Berapa biaya untuk pengemasan? (biaya pengemasan: Rp)	**55.** Berapa biaya yang lainya? (biaya yang lain: Rp)
Musim panen 1		Ya Tidak				
		Ya Tidak				
		Ya Tidak				
Musim panen 2		Ya Tidak				
		Ya Tidak				
		Ya Tidak				
Musim panen 3		Ya Tidak				
		Ya Tidak				
		Ya Tidak				
Musim panen 4		Ya Tidak				
		Ya Tidak				
		Ya Tidak				

		56. Berapa kilogram tomat yang dipanen?	**57.** Berapa rata-rata harga jual tomat per kilogram waktu panen? (Rp/kg)
Musim panen 1	Lokasi A		
	Lokasi B		
	Lokasi C		
Musim panen 2	Lokasi A		
	Lokasi B		
	Lokasi C		
Musim panen 3	Lokasi A		
	Lokasi B		
	Lokasi C		
Musim panen 4	Lokasi A		
	Lokasi B		
	Lokasi C		

58. Jika bapak memerlukan uang untuk menproduksi tomat, apakah bapak bias mendapatkah pinjaman? Ya Tidak

Jika Ya, dimana bapak pinjam?

2. Saudara 2. Bank 3. KUD 4. Lainnya:_________

Berapa bunganya per bulan? _______%

Wortel

	59. Wortel varitas apa yang bapak tanam? (Nama Varitas)	**60.** Berapa jumlah bibit yang bapak tanam? (Kuantitas)	**61.** Biaya bibit **atau**	
			Berapa harga bibit per unit? (harga per unit: Rp)	Berapa biaya total yang di keluarkan? (Total cost: Rp)
Musim panen 1				
Musim panen 2				
Musim panen 3				
Musim panen 4				

		62. Jenis pupuk apa yang digunakan untuk tanaman wortel bapak? (Nama Pupuk)	**63.** Apakah pupuk kimia atau organic?	**64.** Berapa banyak untuk masing- masing pupuk yang digunakan? (Kuantitas— kg)	**65.** Biaya pupuk **atau** Berapa biaya yang bapak keluarkan? (Harga per unit: Rp)	Berapa biaya total untuk pupuk yang bapak keluarkan? (Harga jumulah: Rp)
Musimu panen 1	Lokasi A		Kimia Organik			
			Kimia Organik			
	Lokasi B		Kimia Organik			
			Kimia Organik			
	Lokasi C		Kimia Organik			
			Kimia Organik			
Musimu panen 2	Lokasi A		Kimia Organik			
			Kimia Organik			
	Lokasi B		Kimia Organik			
			Kimia Organik			
	Lokasi C		Kimia Organik			
			Kimia Organik			
Musimu panen 3	Lokasi A		Kimia Organik			
			Kimia Organik			

	Lokasi B		Kimia Organik			
			Kimia Organik			
	Lokasi C		Kimia Organik			
			Kimia Organik			
Musimu panen 4	Lokasi A		Kimia Organik			
			Kimia Organik			
	Lokasi B		Kimia Organik			
			Kimia Organik			
	Lokasi C		Kimia Organik			
			Kimia Organik			

		66. Jenis pestisida apa yang digunakan untuk tanaman wortel bapak? (Nama Pestisida)	**67.** Apakah pestisida kimia atau organic?	**68.** Berapa banyak untuk masing- masing pestisida yang digunakan? (Kuantitas— kg)	**69.** Biaya Pestisida **<u>OR</u>**	
					Berapa biaya yang bapak keluarkan? (Harga per unit: Rp)	Berapa biaya total untuk pupuk yang bapak keluarkan? (Harga jumulah: Rp)
Musimu panen 1	Lokasi A		Kimia Organik			
			Kimia Organik			
	Lokasi B		Kimia Organik			
			Kimia Organik			
	Lokasi C		Kimia Organik			
			Kimia Organik			
Musimu panen 2	Lokasi A		Kimia Organik			
			Kimia Organik			
	Lokasi B		Kimia Organik			
			Kimia Organik			
	Lokasi C		Kimia Organik			
			Kimia Organik			
Musimu panen 3	Lokasi A		Kimia Organik			
			Kimia Organik			

	Lokasi B		Kimia Organik			
			Kimia Organik			
	Lokasi C		Kimia Organik			
			Kimia Organik			
Musimu panen 4	Lokasi A		Kimia Organik			
			Kimia Organik			
	Lokasi B		Kimia Organik			
			Kimia Organik			
	Lokasi C		Kimia Organik			
			Kimia Organik			

		Tenaga kerja	**70.** Berapa orang yang bekerja di tanah bapak untuk prodaksi wortel? (Nomol)	**71.** Berapa lama mereka bekerja sejak tanam sampai panen? (Hari kerja)	**72.** Berapa upah kerja per hari? (Gaji sehari: Rp)
Musimu panen 1	Lokasi A	Tenaga kerja pria			
		Tenaga kerja wanita			
	Lokasi B	Tenaga kerja pria			
		Tenaga kerja wanita			
	Lokasi C	Tenaga kerja pria			
		Tenaga kerja wanita			
Musimu panen 2	Lokasi A	Tenaga kerja pria			
		Tenaga kerja wanita			
	Lokasi B	Tenaga kerja pria			
		Tenaga kerja wanita			
	Lokasi C	Tenaga kerja pria			
		Tenaga kerja wanita			
Musimu panen 3	Lokasi A	Tenaga kerja pria			
		Tenaga kerja wanita			
	Lokasi B	Tenaga kerja pria			
		Tenaga kerja wanita			
	Lokasi C	Tenaga kerja pria			
		Tenaga kerja wanita			
Musimu	Lokasi A	Tenaga kerja pria			

panen 4		Tenaga kerja wanita			
	Lokasi B	Tenaga kerja pria			
		Tenaga kerja wanita			
	Lokasi C	Tenaga kerja pria			
		Tenaga kerja wanita			

		73. Bahan yang lainya yang bapak gunakan di tanah bapak untuk produksi wortel? (plastic, bambu Dll)	**74.** Berapa banyaknya untuk masing-masing? (Quantity)	**75**. Biaya bahan yang lain **atau**	
				Berapa biayanya yang bapak keluarkan? (Harga per unit: Rp)	Berapa total biayanya? (Harga jumulah: Rp)
Musimu panen 1	Lokasi A				
	Lokasi B				
	Lokasi C				
Musimu panen 2	Lokasi A				
	Lokasi B				
	Lokasi C				
Musimu panen 3	Lokasi A				
	Lokasi B				
	Lokasi C				

Musimu panen 4	Lokasi A				
	Lokasi B				
	Lokasi C				

	76. Kepada siapa bapak menjual hasil wortel bapak?	**77.** Apakah bapak harus menyeleksi berdasarkan grade?	**78.** Bagaimana caranya bapak menjual hasil tanaman? *(pilih sara satu)* 1 = perorangan 2 = dengan kolompok tani 3 = kerja sama dengan petani lain 4 = Kontrak *5 = Tebasan* *6 = Borongan* 7 = Lain (jelaskan)	**79.** Berapa biaya transportasinya? (biaya transportatasi: Rp)	**80.** Berapa biaya untuk pengemasan? (biaya pengemasan: Rp)	**81.** Berapa biaya yang lainya? (biaya yang lain: Rp)
Musim panen 1		Ya Tidak				
		Ya Tidak				
		Ya Tidak				
Musim panen 2		Ya Tidak				
		Ya Tidak				
		Ya Tidak				
Musim panen 3		Ya Tidak				
		Ya Tidak				
		Ya Tidak				
Musim panen 4		Ya Tidak				
		Ya Tidak				
		Ya Tidak				

		82. Berapa kilogram wortel yang dipanen?	**83.** Berapa rata-rata harga jual wortel per kilogram waktu panen? (Rp/kg)
Musim panen 1	Lokasi A		
	Lokasi B		
	Lokasi C		
Musim panen 2	Lokasi A		
	Lokasi B		
	Lokasi C		
Musim panen 3	Lokasi A		
	Lokasi B		
	Lokasi C		
Musim panen 4	Lokasi A		
	Lokasi B		
	Lokasi C		

84. Jika bapak memerlukan uang untuk menproduksi wortel, apakah bapak bias mendapatkah pinjaman? Ya Tidak

Jika Ya, dimana bapak pinjam?

3. Saudara 2. Bank 3. KUD 4. Lainnya:_________

Berapa bunganya per bulan? _______%

SECTION 2: Exposure of the DENBAF project pilot farms

	Jika, ya, berilah tanda check
85. Apakah Bapak pernah dengar mengenai demplot Projek organic IPB?	
86. Apakah Bapak pernah melihat demplot tersebut?	
87. Apakah Bapak pernah mengunjungi demplot tersebut?	
88. Apakah Bapak pernah bekerja di demplot tersebut?	
89. Apakah Bapak pernah berbicara dengan orang Projek untuk mempelajari tentang pertanian organic?	
Total number of the checks	

SECTION 3: Information Source

90. Pada tahun sebelumnya, pernahkan Bapak memperoleh informasi produksi sayuran dari beberapa sumber informasi berikut?

	Berilah tanda check	Berilah ranking (3 sumber informasi terpenting)
Radio		
TV		
Majalah dan Jurnal		
Internet		
Petugas penyuluh pertanian		
LSM		
Perusahaan komersial		
Universitas		
Kelompok tani		
Petani organik		
Petani lainnya		
Lainnya_____________		

SECTION 4: Awareness of Organic Vegetable Practices

	Sangat tahu	Tahu	Sepertinya tahu	Tidak tahu	Tidak tahu sama sekali
91. Seberapa jauh Bapak mengetahui kata “pestisida dari tanaman”?	1	2	3	4	5
92. Seberapa jauh Bapak mengetahui bahan-bahan untuk membuat pestisida dari tanaman?	1	2	3	4	5
93. Seberapa jauh Bapak mengetahui bagaimana membuat pestisida dari tanaman?	1	2	3	4	5
94. Seberapa jauh Bapak mengetahui bagaimana menggunakan pestisida dari tanaman?	1	2	3	4	5
95. Seberapa jauh Bapak mengetahu kata “kompos/bokashi”?	1	2	3	4	5
96. Seberapa jauh Bapak mengetahui bahan-bahan untuk membuat kompos/bokashi?	1	2	3	4	5
97. Seberapa jauh Bapak mengetahui bagaimana membuat kompos/bokashi?	1	2	3	4	5
98. Seberapa jauh Bapak mengetahui bagaimana menggunakan kompos/bokashi?	1	2	3	4	5

Definisi Istilah Teknis

- ► **Penggunaan pestisida yang berasal dari tumbuhan/tanaman**: Pakai obat yang terbuat dari tumbuhan untuk membasmi hama.
- ► **Penggunaan hanya pupuk kompos/bokasi:** Pakai hanya pupuk dari kotoran binatang dan tumbuhan.

SECTION 5: Attitude toward the Organic Farming Methods

99. Saya akan menbacakan beberapa pernyataan. Mohon didengarkan baik-baik dan pilih apakah sangat tidak setuju, tidak setuju, netral, setuju, atau sangat setuju.

		Sangat setuju	Setuju	Netral	Tidak setuju	Sangat tidak setuju
a	Petani organik hidup lebih harmonis dengan alam daripada bukan petani organik	1	2	3	4	5
b	Hasil pertanian organic lebih sehat daripada hasil pertanian yang bukan organik	1	2	3	4	5
c	Dimungkinkan mengendalikan rumput liar tanpa obat pembasmi rumput.	1	2	3	4	5
d	Dimungkinkan mengendalikan hama liar tanpa obat pembasm serangga.	1	2	3	4	5
e	Dimungkinkan mengendalikan penyakit liar tanpa obat pembasmi bakteri.	1	2	3	4	5
f	Organik pertanian lebih menguntungkan daripada bukan organik pertanian	1	2	3	4	5

100. Saya akan menbacakan beberapa pernyataan. Mohon didengarkan baik-baik dan pilih apakah sangat tidak setuju, tidak setuju, netral, setuju, atau sangat setuju.

		Sangat setuju	Setuju	Netral	Tidak setuju	Sangat tidak setuju
a	Penggunaan **pestisida yang berasal dari tumbuhan/tanaman** untuk menghindari serangga/hama dapat mengurangi biaya produksi.	1	2	3	4	5
b	Penggunaan **hanya pupuk kompos/bokasi** untuk menghindari serangga/hama dapat mengurangi biaya produksi.	1	2	3	4	5
c	Penggunaan **pestisida yang berasal dari tumbuhan/tanaman** untuk menghindari serangga/hama adalah cocok dengan budaya saya.	1	2	3	4	5
d	Penggunaan **pestisida yang berasal dari tumbuhan/tanaman** untuk menghindari serangga/hama adalah cocok dengan pegalaman saya.	1	2	3	4	5
e	Penggunaan **hanya pupuk kompos/bokasi** untuk menghindari serangga/hama adalah cocok dengan budaya saya.	1	2	3	4	5
f	Penggunaan **hanya pupuk kompos/bokasi** untuk menghindari serangga/hama adalah cocok dengan pegalaman saya.	1	2	3	4	5
g	Penggunaan **pestisida yang berasal dari tumbuhan/tanaman** untuk menghindari serangga/hama adalah mudah.	1	2	3	4	5

h	Penggunaan **hanya pupuk kompos/bokasi** untuk menghindari serangga/hama adalah mudah.	1	2	3	4	5
i	Penggunaan **pestisida yang berasal dari tumbuhan/tanaman** untuk menghindari serangga/hama dapat dicoba di sebagian kecil kebun saya.	1	2	3	4	5
j	Penggunaan **hanya pupuk kompos/bokasi** untuk menghindari serangga/hama dapat dicoba di sebagian kecil kebun saya.	1	2	3	4	5
k	Petani dapat menbedakan dengan mudah antara sayur-sayuran yang tumbuh menggunakan **pestisida yang berasal dari tumbuhan/tanaman** dengan sayur-sayuran yang tumbuh mengunakan insektisida kimia.	1	2	3	4	5
l	Petani dapat menbedakan dengan mudah antara sayur-sayuran yang tumbuh menggunakan **hanya pupuk kompos/bokasi** dengan sayur-sayuran yang tumbuh mengunakan pupuk kimia.	1	2	3	4	5

SECTION 6: Intention of Organic Conversion

	Kol		Tomat		Wortel	
101. Apakah bapak sudah pernah mengunakan **hanya pupuk kompos/bokasi**?	Ya	Tidak	Ya	Tidak	Ya	Tidak
Jika Ya, kapan?						

Jika tidak, kenapa?____

Jika tidak, apakah bapak akan mengunakan teknik pertanian organik untuk produksi masing-masing tanaman dibawah ini?

	Saya akan berubah	Saya mungkin berubah	Saya tidak tahu	Saya mungking tidak akan berubah	Saya tidak akan berubah
Saya bermaksud mengunakan **hanya pupuk kompos/bokasi** untuk produksi tanaman **kol**.	1	2	3	4	5
Saya bermaksud mengunakan **hanya pupuk kompos/bokasi** untuk produksi tanaman **tomat**.	1	2	3	4	5
Saya bermaksud mengunakan **hanya pupuk kompos/bokasi** untuk produksi tanama **wortel**.	1	2	3	4	5

Jika tidak, kenapa?____

	Kol	Tomat	Wortel
102. Apakah bapak sudah pernah mengunakan **pestisida yang berasal dari tumbuhan/tanaman**?	Ya Tidak	Ya Tidak	Ya Tidak
Jika Ya, kapan?			

Jika tidak, kenapa?____

Jika tidak, apakah bapak akan mengunakan teknik pertanian organik untuk produksi masing-masing tanaman dibawah ini?

	Saya akan berubah	Saya mungkin berubah	Saya tidak tahu	Saya mungking tidak akan berubah	Saya tidak akan berubah
Saya bermaksud mengunakan **pestisida yang berasal dari tumbuhan/tanaman** untuk produksi tanaman **kol**.	1	2	3	4	5
Saya bermaksud mengunakan **pestisida yang berasal dari tumbuhan/tanaman** untuk produksi tanaman **tomat**.	1	2	3	4	5
Saya bermaksud mengunakan **pestisida yang berasal dari tumbuhan/tanaman** untuk produksi tanaman **wortel**.	1	2	3	4	5

Jika tidak, kenapa?____

SECTION 7: Background Information

Tolong kasih tahu tentang keluarga bapak.

103. Nama	**104.** jenis kelamin 1=Pria 2=Wanita	**105.** Umur	**106.** Hubungan keluarga	**107.** Pendidilan terakhir 1. Tidak sekolah 2. Tidak tamat SD 3. Tamat SD 4. Tidak tamat SMP 5. Tamat SMP 6. Tidak tamat SMA 7. Tamat SMA 8. D1-D3 9. Sarjana or atas	**108.** Pekrjaan 1. Petani 2. Buru tani 3. Wira swasita 4. Pegawai neguri 5. Dagang 6. Buru bangunan 7.DLL	Jika pekrjaanya petani/buru tani, sudah berapa lama menjadi petani?
			Kepara keluarga			

109. Berapa jauh rumah bapak dari percontohan organik IPB? ___________km

Terima kasih banyak!!

Appendix D: Interview Guideline

Interview Schedule for Policy maker of organic farming in Indonesia

I. **Opening**

1. **(Establish Rapport)** [Bow] My name is Chifumi Takagi and I am a graduate student and participating in a project of Bogor Agricultural University/Udayana University. I am conducting this interview for my dissertation research.
2. **(Purpose)** I would like to ask you some questions regarding policy about organic agriculture, especially for vegetable in order to answer the question "what is the government doing to support organic agriculture?"
3. **(Motivation)** I hope that the data I collect provide useful information for potential organic farmers in Indonesia.
4. **(Time Line)** The interview should take around 30 minutes. Are you available to respond to some questions at this time?

(Transition: Let me begin by asking you some questions about the policy of integrated pest management (IPM) and organic agriculture in Indonesia)

II **Body**

(Topic) IPM policy

Explain: Since Indonesia started to implement IPM policies in 1980s, the national government (Ministry of Agriculture) led the IPM programs and in 1989, the first national IPM program was established as a follow-up of Presidential Decree No.3/1986.

1. Are you familiar with the decree?

a. (If Yes) Can you tell me what the decree involved?
b. (If No) I would like to read the decree. Do you know where I can find a copy?

Explain: After the Asian financial crisis in 1997, the national government changed the structure of ministries and agencies; the national government program has now shifted to a local based program.

2. What IPM programs/activities are currently conducted by the local (West Java/Bali) government?

3. How are the IPM programs/activities currently conducted by the local (West Java/Bali) government?

(Transition to the next topic: Next, let me ask you some questions about policies concerning organic agriculture)

(Topic) Organic agriculture policy

Explain: In 2000, the Ministry of Agriculture established a policy about organic agriculture, which was called 'Go Organic 2010'.

1. What are the details of the policy 'Go Organic 2010'?

   a. Are there any laws that regulate production of organic vegetables?

   If Yes, what are the components of the laws?

   b. Are there any government programs (subsidies) that help farmers convert to organic vegetable farming?

   If Yes, what type of assistance do the programs provide to farmers?

   c. Are there any organic certification programs for vegetables production?

   If Yes, what are the requirements for certification? How does the government enforce these requirements?

(**Transition:** Well, that is all what I want to ask you today.)

III **Closing**

1. (**Maintain Rapport**) I appreciate the time you took for this interview. Is there anything else you think would be helpful for me to know so that I can understand the policy about organic agriculture?

2. (**Action to be taken**) I should have all the information I need. Would it be alright to call you at your office if I have any more questions? Thank you again.

Interview Schedule for Regional Extension Agents

I. **Opening**

1. **(Establish Rapport)** [Bow] My name is Chifumi Takagi and I am a graduate student and participating in a project of Bogor Agricultural University/Udayana University. I am conducting this interview for my dissertation research.

2. **(Purpose)** I would like to ask you some questions about the agricultural extension system in order to answer the question "What are the agricultural extension agents doing to support organic farming?"

3. **(Motivation)** I hope that the data I collect provide useful information for potential organic farmers in Indonesia.

4. **(Time Line)** The interview should take around 30 minutes. Are you available to respond to some questions at this time?

(Transition: Let me begin by asking you some questions about the current extension organizational system and function)

II **Body**

(Topic) Extension system and function

Explain: In the 1990s, Indonesia began to implement decentralize extension. It shifted extension management from the central to the district government, made extension more agribusiness-oriented and less community-related and established research-extension-farmer linkage mechanisms at the local level.

1. How is the current extension service organized in West Java/Bali? (e.g. organizational chart)

2. How does each division/department serve the farmers?

(Transition to the next topic: Next, let me ask you some questions about information, related to organic agriculture)

(Topic) Information about organic agriculture

1. Does the agency for agricultural research and development in the

extension system currently have any projects related to organic vegetable production?

If Yes, what projects are they?

2. Do district-level extension agents provide any information related to organic vegetable production?

If Yes, what type of information do they provide?

(**Transition:** Well, that is all what I want to ask you today.)

III **Closing**

1. (**Maintain Rapport**) I appreciate the time you took for this interview. Is there anything else you think would be helpful for me to know so that I can understand the agricultural extension system?

2. (**Action to be taken**) I should have all the information I need. Would it be alright to call you at your office if I have any more questions? Thank you again.

Interview Schedule for Marketing People of Organic Vegetable

I. **Opening**

1. **(Establish Rapport)** [Bow] My name is Chifumi Takagi and I am a graduate student and participating in a project of Bogor Agricultural University/Udayana University. I am conducting this interview for my dissertation research.
2. **(Purpose)** I would like to ask you some questions about the organic vegetable marketing system in order to answer the question "What are organic vegetable marketing channels and are issues and problems to sell organic vegetables in Indonesia?"
3. **(Motivation)** I hope that the data I collect provide useful information for potential organic farmers in Indonesia.
4. **(Time Line)** The interview should take around 30 minutes. Are you available to respond to some questions at this time?
5.

(Transition: Let me begin by asking you some questions about the current organic vegetable marketing system)

II **Body**

(Topic) Organic vegetable marketing system

Explain: There may be several organic vegetable marketing channels.

1. To where do you sell organic vegetables?
2. How do you sell organic vegetables to each place?
3. What are the vegetable prices to each place?

(Transition to the next topic: Next, let me ask you some questions about the issues and problems to sell organic vegetables.)

(Topic) Issues and problems for organic vegetable marketing

1. Are there any issue and problems to sell organic vegetables?
   If Yes, what are they?

(Transition: Well, that is all what I want to ask you today.)

III **Closing**

1. **(Maintain Rapport)** I appreciate the time you took for this interview. Is there anything else you think would be helpful for me to know so that I can understand the organic vegetable marketing system?

2. **(Action to be taken)** I should have all the information I need. Would it be alright to call you at your office if I have any more questions? Thank you again.

Appendix E: Interview Transcribed Notes

Interview Answers of Policy maker of organic farming in Indonesia (Summary)

Ms. A in Jakarta

Date when signed on the research consent form: August 22, 2007

(Topic) IPM policy

Explain: Since Indonesia started to implement IPM policies in 1980s, the national government (Ministry of Agriculture) led the IPM programs and in 1989, the first national IPM program was established as a follow-up of Presidential Decree No.3/1986.

Are you familiar with the decree?

No.

(If Yes) Can you tell me what the decree involved?

(If No) I would like to read the decree. Do you know where I can find a copy?

I could not get the decree, but I can read a book "IPM in the Global Arena" written by Dr. Oka to learn the IPM policy in Indonesia.

Explain: After the Asian financial crisis in 1997, the national government changed the structure of ministries and agencies; the national government program has now shifted to a local based program.

a. What IPM programs/activities are currently conducted by the local (West Java/Bali) government?

b. How the IPM programs/activities are currently conducted by the local (West Java/Bali) government?

I don't work at the rural extension centers and don't know about the IPM program at the local level. Please ask these questions to the extension agents.

(Topic) Organic agriculture policy

1. What are the details of the policy 'Go Organic 2010'?
Instead of answering this question, Ms. A gave me a PPT file and papers made by Department of Agriculture to understand the policy.

a. Are there any laws that regulate production of organic vegetables?
If Yes, what are the components of the laws?
Yes, there are some laws to support organic products, but there have not been any punishments if deviate the SNI—Standard National Indonesia.

b. Are there any government programs (subsidies) that help farmers convert to organic vegetable farming? **Yes**

If Yes, what type of assistance do the programs provide to farmers?

Subsidies to get organic certifications—Department of Agriculture subsidizes 10-12% of the total cost to get organic certifications for potential organic farmers. But "potential organic farmers" will be identified by the Department of Agriculture.

c. Are there any organic certification programs for vegetables production?

If Yes, what are the requirements for certification? How does the government enforce these requirements?

Yes, there are several organic certificate agents in Indonesia. They will give the organic certification based on the SNI, but the methods and costs are various. However, there have not been any punishments if deviate the SNI. Ms. A gave me papers related to the certification issue.

Interview Answers of Regional Extension Agents (summary)

Mr. B and C in West Java

Date when signed on the research consent form: August 13, 2007

(Topic) Extension system and function

Explain: In the 1990s, Indonesia began to implement decentralize extension. It shifted extension management from the central to the district government, made extension more agribusiness-oriented and less community-related and established research-extension-farmer linkage mechanisms at the local level.

1. How is the current extension service organized in West Java/Bali? (e.g. organizational chart)

Mr. B drew the current structure of extension system in Department of Agriculture and Forestry in Bogor district by free-hand.

2. How does each division/department serve the farmers?

Yes, each region (province and district) has different extension system. In Bogor district, extension system belongs to the Department of Agriculture and Forestry. This center is one of UPTD (unit pelaksana teknis dinas), which means the rural extension center. Before the decentralization, the rural extension centers located at each sub-district with different name *(Balai Penyuluhan Pertanian, BPP). But now the centers are placed by functions. There are 20 UPTD in Bogor district; 12 for agricultural extension, 2 for agricultural machine, 2 for rice seedling, 3 for lumber, and 1 for dry field. This center is one of 12 agricultural extension function centers.*

This center covers three sub-districts (Cisarua, Megamedung, and Ciawi) with 34 villages. Cisarua sub-district has 10 villages; two field extension workers for crop production and one for livestock are assigned. In Megamedung sub-district, there are 11villages; two field extension workers for crop production and one for livestock are assigned. Ciawi sub-district has 13 villages; three field extension workers for crop production and one for livestock are assigned. For all regions, there is a field extension worker for pest and plant pathology in the center.

*Before **decentralization**, there were five types of extension field workers: vegetable, cereal, pest and plant pathology, livestock, and fishery. Also an extension worker was assigned only one or two villages. Thus they could rotate farmers frequently. But now an extension worker has to rotate more than five villages and many of them have to cover different fields. For example, an extension worker was assigned in fishery field, but now the worker has to work in livestock field. Also, the worker could see a farmer every two weeks, but now once a two months or more time length were needed. So, it is very difficult to provide useful information for farmers effectively.*

(Topic) Information about organic agriculture
1. Does the agency for agricultural research and development in the extension system currently have any projects related to organic vegetable production?
If Yes, what projects are they?
Not yet.

2. Do district-level extension agents provide any information related to organic vegetable production?

Yes.

If Yes, what type of information do they provide?

We have not special program for organic farming, but mainly we have three activities/program related to organic farming and provide various information:

1. we call "SLPHT," which short for Sekolah Lapang Pengendalian Hama Terpadu in Bahasa Indonesia. This means IPM school for farmers. This is a government program to increase farmers' knowledge about IPM.

2. we conduct "farmers' school (sekolah tani)" once a month. In the school, we teach different topics needed for farmers. Sometime we teach about organic farming related topics.

3. we are managing demonstration farm to examine several techniques including IPM and application of compost.

Interview Answers of Regional Extension Agents (summary)

Mr. D and E in Bali

Date when signed on the research consent form by Mr. D: October 24, 2007

Date when signed on the research consent form by Mr. E: October 21, 2007

(Topic) Extension system and function

Explain: In the 1990s, Indonesia began to implement decentralize extension. It shifted extension management from the central to the district government, made extension more agribusiness-oriented and less community-related and established research-extension-farmer linkage mechanisms at the local level.

1. How is the current extension service organized in West Java/Bali? (e.g. organizational chart)

Mr. E drew the current structure of extension unit in Tabanan district by free-hand.

2. How does each division/department serve the farmers?

In Tabanan district, extension system was independent from the Department of Agriculture in Tabanan. Now an extension unit holds all extension functions in Tabanan. However, the bottom parts of the extension system don't change. This center is one of BPP (Balai Penyuluhan Pertanian), which means the rural extension center at sub-district level like before.

This center covers one sub-district (Baturiti) with 12 villages. An extension field worker is assigned in each village. The one extension worker has to cover all agricultural fields. Before the decentralization, there were five types of extension field workers: vegetable, cereal, pest and plant pathology, livestock, and fishery. But now an extension worker has to cover all fields. So, it is very difficult to provide useful information for farmers efficiently. Every Monday all extension field workers gather to attend the weekly meeting and they share all information with other extension workers.

Main functions of the extension center:

- ***Make agricultural data base in Batruriti sub-district***
- ***Conduct a village meeting once a year***
- ***Assist to organize farmers' group***
- ***Manage demonstration farm***

(Topic) Information about organic agriculture

1. Does the agency for agricultural research and development in the extension system currently have any projects related to organic vegetable production?
If Yes, what projects are they?
Yes. We have a program to make compost from chicken manure using microorganisms. Also we examine effectiveness of the compost at small plots by different crops.

2. Do district-level extension agents provide any information related to organic vegetable production?

Yes.

If Yes, what type of information do they provide?

Based on the result of the compost program, we disseminate the information to farmers.

Interview Answers of Marketing of Organic Farming (Summary)

Mr. F in West Java

Date when signed on the research consent form: August 26, 2007

(Topic) Organic vegetable marketing system

1. To where do you sell organic vegetables?

- ***Two Japanese Supermarkets***
- ***Individual households and offices in Jakarta (2 times a week—Mon&Thu). Current consumers are about 120 households and 75% is Japanese.***
-

2. How do you sell organic vegetables to each place?

Mr. F has a car with refrigerator and ship/deliver organic vegetables to Jakarta using the car twice a week. When I followed Mr. F's delivery to Jakarta, found that at an apartment/office, there is a household called "station" that collects and pays members' vegetable charge and keep the vegetables for a while. Then each household pick it up from the station.

3. What are the vegetable prices to each place?

Mr. F gave me the price lists.

(Topic) Issues and problems for organic vegetable marketing

1. Are there any issue and problems to sell organic vegetables?

Yes

If Yes, what are they?
New comers as organic farmers indicate "organic vegetable" without understanding "true organic vegetables" to sell their products—their "organic vegetables" are not organic vegetables primarily. If some farmers sell "fake" organic vegetables, customers may not start to trust Mr. F's organic vegetables either.

Mr. F is the most success organic farmer among organic farmers in Sukagalih village. The Japanese customers make several consumer groups at each apartment complex to support Mr. F. This is the key reason why Mr. F can get many Japanese customers.

Interview Answers of Marketing of Organic Farming (Summary)

Mr. G in West Java

Date when signed on the research consent form: August 24, 2007

(Topic) Organic vegetable marketing system

1. To where do you sell organic vegetables?

- ***Organic food retail stores in Bogor***
- ***One Yoga school place in Bogor***
- ***10 individual home-delivery customers in Bogor and 10 customers in Jakarta (all rich Indonesian households).***
- ***2 banks in Jakarta***

2. How do you sell organic vegetables to each place?

Mr. F has a car and uses ice when he delivers organic vegetables to Bogor and Jakarta twice a week (Tuesday and Friday). When I followed his delivery to Bogor, he delivered his vegetables to a Yoga school (students are all Japanese and his customers), one organic food retail shop, and stopped by five individual households to sell.

3. What are the vegetable prices to each place?

Mr. G gave me the price lists.

(Topic) Issues and problems for organic vegetable marketing

1. Are there any issue and problems to sell organic vegetables?

Yes

If Yes, what are they?
There are many people who don't know or cannot understand what organic vegetables are. Mr. G always invites his potential customers to his organic farm so that they can see and may be able to understand what organic vegetable is.

Mr. G is the first person to start organic farming in Sukagalih village. After that, several people started organic farming followed him. Whenever the new people wanted to learn about organic farming from Mr. G, he always told his knowledge and experience to them. But some of them didn't give enough information when Mr. G asked about their organic farming. He believes that organic farmers need to help each other to make a famous organic vegetable production area. If the Sukagalih village becomes famous area of organic vegetable production, people will come here to buy organic vegetables; Mr. G and other organic farmers don' need to deliver the vegetables to far places and they can focus on production. Also, they can reduce their selling costs.

Interview Answers of Marketing of Organic Farming (Summary)

Mr. H in Bali

Date when signed on the research consent form: September 16, 2007

(Topic) Organic vegetable marketing system

1. To where do you sell organic vegetables?

- ***his restaurant in Ubud***
- ***his hotel in Ubud***
- ***If there are extra vegetables, bring to the farmers' market in Ubud***

2. How do you sell organic vegetables to each place?

From July to August, every day Mr. H's employees harvest and deliver the vegetables to Ubud by car. In Septembr, every two days do so.

3. What are the vegetable prices to each place?

Since almost of all organic vegetables were consumed at my restaurant and hotel, there are no prices to sell to other place.

(Topic) Issues and problems for organic vegetable marketing

1. Are there any issue and problems to sell organic vegetables?

No

If Yes, what are they?

Interview Answers of Marketing of Organic Farming (Summary)

Mr. I in Bali

Date when signed on the research consent form: October 24, 2007

(Topic) Organic vegetable marketing system

1. To where do you sell organic vegetables? ***(In Mr. I's case, he sells conventional vegetables, too)***

- ***Supermarkets in Denpasar***
- ***Hotels in the southern resort area in Bali***
- ***Restaurants in southern resort area in Bali***

2. How do you sell organic vegetables to each place?

Mr. I is a vegetable broker. He has a car and periodically comes to the Bangli village to collect vegetables from farmers. Among the collected vegetables, there are few organic vegetables.

3. What are the vegetable prices to each place?

About four years ago, he sold organic vegetables to an organic food restaurant. At that time he made a price list for organic vegetables. He asked several vegetable farmers to grow vegetable ordered from the restaurant. But the restaurant closed a business after two years. Since then Mr. I doesn't have a price list.

(Topic) Issues and problems for organic vegetable marketing

1. Are there any issue and problems to sell organic vegetables?

Yes

If Yes, what are they?
In order to sell organic vegetables to supermarkets in Denpasar, they demand "organic certification." Technically, it may be not so difficult to obtain the certificate, but the main problem is its cost. If Mr. I asked farmers to do so, they cannot get profit because the certification cost is very expensive.

When Mr. I sold organic vegetables to supermarkets five years ago (in 2002), they didn't request the organic certificate (because there was not the organic certification system in Indonesia at that time), they didn't understand what organic vegetables were; not good looking compared to the conventional vegetables including many worm-eaten

holes on the vegetables and their prices were higher than conventional vegetables. Thus Mr. I failed to sell organic vegetables.

Field Note

A NGO as a pioneer of organic farming in Indonesia

Talked with the field manager, Mr. J

Visited the NGO on August 21, 2007

1. Reason why I visited the NGO

During the interview with organic farmers in the study village, this NGO's name was frequently listened. When I asked about the NGO to the farmers, I was told that the NGO is a pioneer of organic farming in Indonesia and out of five organic farmers in the study village; four of them had an experience to study organic farming at the NGO. Also, according to them, the NGO is not so far from the study site. Thus I went to the NGO for my study.

2. Overview of the NGO

Located in sub-district of Cisarua, District of Bogor. It took about 20 minutes by bike taxi from the study site in West Java.

A Swiss pastor started organic farming in this place in 1984. This NGO is a pioneer of organic farming in Indonesia. Nowadays many people visit the NGO to learn organic farming. The NGO provide various training program for these people.

The NGO has 16 ha of land in total and currently uses 10 ha for vegetable production. So far 110 employees are worked in the NGO; 40 people works on farm, 20 people works at offices, and 50 people works construction sites.

The NGO has a store near the farm so that customers can buy organic vegetables directly from this NGO. There are two main market channels; one is NGO – supermarkets – consumers, the other is NGO – NGO's agents – consumers. The NGO has 15 agents in Bogor and Jakarta. These agents buy vegetables from the NGO with special price and they can sell the vegetables at their prices. In total income of this NGO, 70 % comes from the agents' sales and 30 % comes from sales of supermarkets and the NGO's store. To provide enough amount and variety of vegetables, there are 25 contract farmers (21 farmers use the NGO's farming lands and 4 farmers use their own lands) , who grow organic vegetables following the NGO's methods exactly.

I got the NGO's price list.

3. Current Problems

There are three main problems. First problem is plant disease and climate. In recent years, there were long dry seasons and in the rain season, sometimes there were too much water for vegetables. Under these unexpected climates, it is very difficult to control diseases.

Second problem is employees' working habit. Some staff work very roughly and these influence vegetable production badly.

Third problem is marketing. There are still many people who do not understand what organic vegetables are, and these people likely don't buy organic vegetables.

4. A bad experience of export cabbages to Singapore

About five years ago (in 2002), the NGO received a big cabbage order from Singapore. That was the first order from foreign country for the NGO. But the client requested to obtain the organic certification for cabbage. At that time, there were no that certification system in Indonesia, the NGO obtained an organic certification from an Australian organic certified organization. After the formal contract, the NGO shipped the first cabbages to Singapore. To do so, cabbages were harvested and packed on the shipping day's very early morning; they were exported to Singapore by airplane and arrived there around 7 am. Then the cabbages were delivered to each supermarket before the store's open time. For the first contract period, there were no claims and it worked well. However, when the second contract period started, the assigned person of client was changed. And the new person claimed that the cabbages spoiled when they open the boxes in Singapore several times. The NGO sent staff to Singapore to check the quality of the cabbages. In Singapore, the NGO staff asked the new client to see the cabbages. However, the client told them that the cabbages were already dumped because they already went off. The staff could not believe because the cabbages were harvested, shipped from Jakarta and arrived in Singapore on the same day and it took for about five hours to complete the all process such that:

Delivered from Bogor to Jakarta is about for 1.5 hours;

Flew from Jakarta to Singapore is about for 1 hour;

In Singapore, to complete all quarantine process may be about 2 hours;

After that the client checks the cabbages to deliver them to the supermarkets. The NGO tried to do their best to remove the problem, but finally they judged that the client's accusation was not true. Since then, the NGO has not export their products to any countries

. Field Note

A Japanese customer of Mr. F's organic vegetables

Interviewed with Ms. K on August 15, 2007

1. Reason why I interviewed with Ms. K.

Before going to the delivery, I had asked Mr. F about the trigger to get Japanese customers couple of times, but I could not understand by that time.

When I followed Mr. F's vegetable delivery to Jakarta on August 13th of 2007, I met with Ms. K as one of Mr. F's customer. When I passed the vegetables to her, she mentioned that she had bought the vegetables from Mr. F for long time. At that time, I wondered if Ms. K knew how Mr. F got these Japanese customers.

The vegetables were prepared (harvested, rinsed and packed) the day before of the delivery day (Sunday) and kept them in a refrigerator for one night. On the delivery day, Mr. F, his staff and I left Mr. F's farm at 5:30am. Jakarta's traffic jam was terrible on the day and we arrived at the first delivery place, a Japanese supermarket around 8 am, then we went to the second place, another Japanese supermarket around 8:20 am. After the second place, we ate breakfast near Block M. During the breakfast, Mr. F told me that we would go to 13 apartments/house complexes and 2 offices for about 60 customers to deliver the vegetables. The Japanese customers organized a consumer group in each apartment complex and one person received all members' ordered vegetables from Mr. F, and paid all members' vegetable cost to Mr. F. It was very helpful for Mr. F to reduce his time and cost. When we completed all deliveries in Jakarta and came back to the study site, it was already 6 pm.

2. About Ms. K

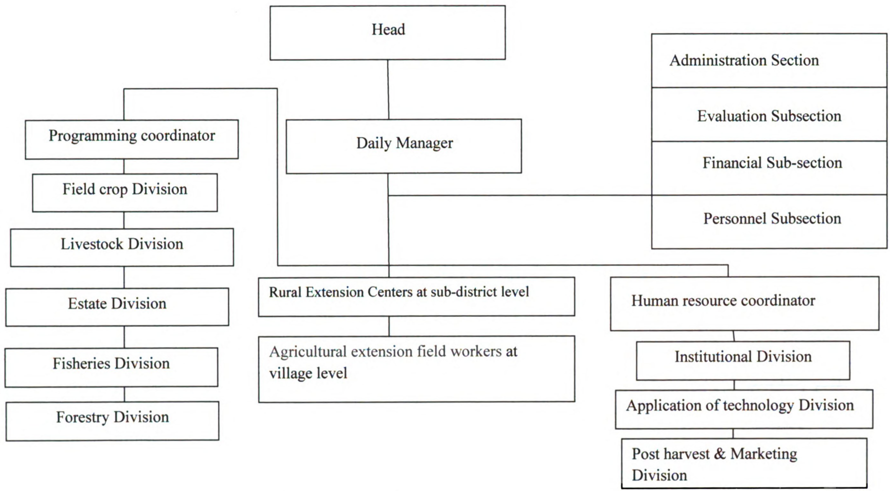
Ms. K lives in Jakarta for 20 years. Her husband is an accountant and worked a Japanese company in Jakarta. She followed her husband and her two sons also spent their time in Indonesia until they graduated high school. Now they are independent from the parents and Ms. K lives with her husband in a house at Pondock Indah. She looked around late 50s or early 60s.

3. The trigger

According to Ms. K, Mr. F used to get training of organic farming at the OISCA (a Japanese NGO), and after the training, Mr. F started organic farming in the study site with the landowner's agreement. One day Mr. F met with a JICA expert whose major was crop production (Connection between a JICA expert and Mr. F was unclear). At the early stage of his organic farm, Mr. F had many problems for his vegetable production. Mr. F got advises to improve his vegetables from the expert. The expert's wife was also there with her husband. She had an experience to manage consumer group at Japanese organic supported agricultural groups. At these groups in Japan, consumers support organic farmers through helping farm works and shipment works. From Mr. F's serious attitude of studying, she thought that she wanted to support Mr. F's organic farming like Japanese groups. In Jakarta at that time (around 2002) there was no organic vegetable home-delivery service. And many Japanese wives/mothers had strong interests about organic vegetables. The expert's wife started to ask from her friends if they want to buy organic vegetable from Mr. F's farm. Slowly and surely the members were getting increase. The expert's wife disseminated farm's information to the consumer group by newsletters and sometimes took some members to Mr. F's farm to increase their understanding of organic farming. Mr. F also accepted the consumers' requests, and they had built a very good relationship. Especially Mr. F's honest and sincere character helped to increase the Japanese consumers.

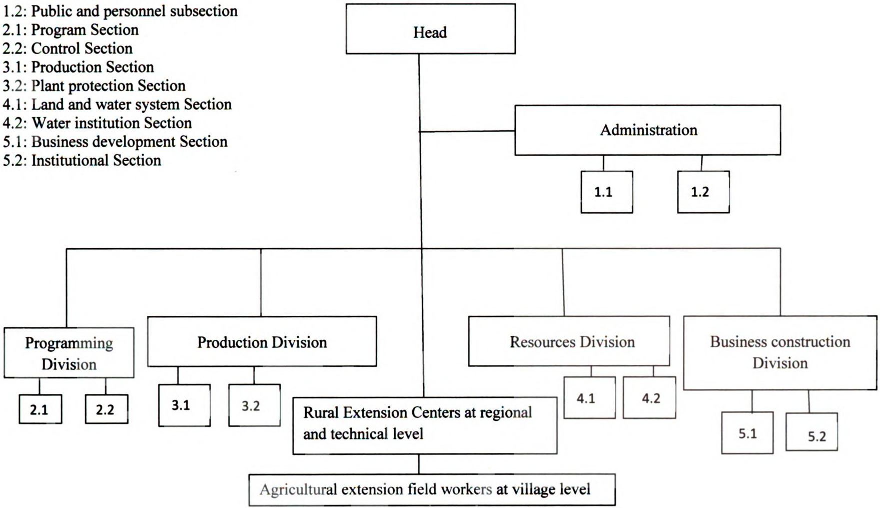
4. Things become change...

Usually Japanese workers' residence period is from three to five years. Thus Japanese society in Jakarta changes rapidly. Ms. K also looked after many people including the expert's wife. As follow the change of people, the form of consumer group of Mr. F's farm also changes. In the past years, majority of consumers were like the expert's wife; members were interested organic food and also wanted to cooperate in helping Mr. F's farm activities. However, new comers are different from before; they are still interested in organic food, but have less interest about Mr. F's farm and the consumer group activities. Nowadays, very few members disseminate the information about Mr. F's farm or vegetables' recipe by newsletters.



Organizational Structure of Extension Unit in Tabanan District, Bali since 2007

1.1: Financial subsection
1.2: Public and personnel subsection
2.1: Program Section
2.2: Control Section
3.1: Production Section
3.2: Plant protection Section
4.1: Land and water system Section
4.2: Water institution Section
5.1: Business development Section
5.2: Institutional Section



Organizational Structure of Department of Agriculture and Forestry in Bogor District, West Java since 2007

Bibliography

REFERENCES

Academic Frontier Research Center (2005). *Development of New Bio-Agents for Alternative Farming Systems: 2004 Report.* Tokyo, Japan: Tokyo University of Agriculture.

Academic Frontier Research Center (2006). *Development of New Bio-Agents for Alternative Farming Systems: 2005 Report.* Tokyo, Japan: Tokyo University of Agriculture.

Adrian, A. M., Norwood, S. H., & Mask, P. L. (2005). Producers' Perceptions and Attitudes toward Precision Agriculture Technologies. *Computers and Electronics in Agriculture, 48*(3), 256-271.

Agung, M. (2001). Transisi ke Pertanian Organic [Transition to Organic Farming]. Seminar regional dan prospek pengembangannya di Bali. Hut. XXXIV dan BK. XXIII Fak. Pertanian UNUD.

Ajzen, I., & Fishbein, M. (1980). *Understanding Attitudes and Predicting Social Behavior*. Englewood Cliffs, NJ: Prentice-Hall.

Ajzen, I. (1988). *Attitudes, Personality, and Behavior*. Chicago, IL: The Dorsey Press.

Alreck, P. L., & Settle, R. B. (1995). *The Survey Research Handbook.* Homewood, IL: McGraw-Hill/Irwin.

Alimoeso, S., Nasikin, and Wienarto, N. (2001). *Country Report- Indonesia*. Paper presented at the meeting of the program advisory committee, Ayutthaya, Thailand.

Anderson, J. and Feder, G. (1994). *Agricultural Extension: Lessons from Complete Projects.* Washington, D. C: World Bank.

Antholt, C. H. (1998). Agricultural Extension in the Twenty-First Century. In C. K. Eicher & J. M. Staatz (Eds.), *International Agricultural Development: Third Edition* (pp. 354-370). Baltimore, Maryland: Johns Hopkins University Press.

Arya, N., Temaja, R. M., & Suyama, K. (2005). Evaluation of Several Cabbage Varieties Against Club-Root Disease of Crucifers. *Journal of International Society for Southeast Asian Agricultural Sciences, 11*(3), 115-120.

Arya, N., Temaja, R. M., & Wirya, A. S. (2001). Integrated Pest Management for Vegetable Production in Highland Bali. In A. Fujimoto & K. Abdullah (Eds.), *Highland Vegetable Cultivation in Indonesia* (pp. 305-314). Tokyo, Japan: World Planning Co., LTD.

Badan Pusat Statistik (1999). *Statistical Pocketbook of Indonesia.* Jakarta, Indonesia.

Badan Pusat Statistik (2009). *Statistical Pocketbook of Indonesia.* Jakarta, Indonesia.

Banerjee, S., Martin, S. W., Roberts, R. K., Larkin, S. L., Larson, J. A., Paxton, K. W., et al. (2008). A Binary Logit Estimation of Factors Affecting Adoption of GPS Guidance Systems by Cotton Producers. *Journal of Agricultural and Applied Economics, 40*(1), 345-355.

Bayard, B., & Jolly, C. (2007). Environmental Behavior Structure and Socio-Economic Conditions of Hillside Farmers: A Multiple-Group Structural Equation Modeling Approach. *Ecological Economics, 62*(3-4), 433-440.

Beharrell, B., & Crockett, A. (1992). New Age food! New Age consumers! *British Food Journal, 94*(7), 5-13.

Bennett, C., & Rockwell, K. (1994). Targeting Outcomes of Programs (TOP): An Integrated Approach to Planning and Evaluation. *Unpublished manuscript. Lincoln, NE: University of Nebraska.*

Benor, D., & Harrison, J. Q. (1977). *Agricultural Extension: The Training and Visit System.* Washington, D.C.: The World Bank.

Benor, D. (1987). Training and Visit: Back to Basics. In W. River & S. Schram (Eds.), *Agricultural Extension Worldwide: Issues, Practices and Emerging Priorities* (pp. 137-148). London: Croom Helm.

Berg, B. L. (2004). *Qualitative Research Methods: Fifth Edition.* Boston, MA: Peason Allyn and Bacon.

BIOCert. (2004). Position paper on organic certification. BIOCer's Organic Certification: A way to Protect Small Scaled-Farmers. Retrieved December 10, 2004, from http://eng.biocert.or.id/tentang.php?aid=47

Britan, G. M. (1985). AID's Experience in Agricultural Extension. Paper presented to the Joint Committee for Agricultural Research and Development, Washington, D.C.

Calantone, R. J., Griffith, D. A., & Yalcinkaya, G. (2006). An Empirical Examination of a Technology Adoption Model for the Context of China. *Journal of International Marketing, 14*(4), 1-27.

Cavane, E. P. A. (2007). *Farmers' Attitudes and Adoption of Improved Maize Varieties and Chemical Fertilizers in the Manica District, Mozambique* (Doctoral dissertation). Michigan State University, East Lansing, MI.

Centre for Agriculture Standardization and Accreditation. (2006). Kebijakan Departemen Pertanian Dalam Pengembangan Produk Pangan Organik [Policy Development of Organic Food Products in the Department of Agriculture]. Unpublished power point manuscript.

CGIAR. (2006). *Who We Are.* Retrieved December 20, 2006, from http://www.cgiar.org/who/index.html

Chambers, R. (1983). *Rural Development: Putting the Last First.* London, U.K.: Longman.

Cramer, J. S. (2003). *Logit Models from Economics and Other Fields.* Cambridge, U.K.: Cambridge University Press.

Creswell, J. W. (2003). *Research Design. Qualitative, Quantitative, and Mixed Methods Approaches: Second Edition.* London, U.K.: SAGE Publications.

Crucefix, D. (1998). *Organic Agriculture and Sustainable Rural Livelihoods in*

Developing Countries. Bristol: Soil Association.

Dabbert, S. (1994). Economics of Conversion to Organic Farming: Cross-Sectional Analysis of Survey Data. In N. H. Lampkin & S. Padel (Eds.), *The Economics of Organic Farming: An International Perspective* (pp. 285-293). Wallingford, U.K.: CAB-International.

Dadang, A, and Ohsawa, K. (2005). The Effectiveness of Plant Extracts in Reducing Cabbage Insect Pest Population and Their Effect on Natural Enemies. *Journal of International Society for Southeast Asian Agricultural Sciences, 11*(3), 142-149.

Dadang, G. S., Nawangsih, A. A., Syaukat, Y., & Tjahjono, B. (2006). *Development of Organic Rice and Vegetables in the District of Bogor, West Java, Indonesia: Development of New Bio-Agents for Alternative Farming Systems: 2005 Report*. Tokyo, Japan: Academic Frontier Research Center, Tokyo University of Agriculture.

Darmawan, D. A., & Pasandaran, E. (2000). Indonesia. In M. Ali (Ed.), *Dynamics of Vegetable Production, Distribution and Consumption in Asia*. Taiwan: The world vegetable center.

De Cock, L. (2005). *Determinants of Organic Farming Conversion.* Paper presented at the The sixth International Congress of the European Association of Agricultural Economists, 'The future of rural Europe in the global agri-food system', Copenhagen, Denmark.

Dinata, K., Arta, N., & Temaja, R. M. (2001). Vegetable Yields Under Tumpangsari. *Highland Vegetable Cultivation in Indonesia* (pp. 331-337). Tokyo, Japan: World Planning Co., LTD.

Duram, L. A. (1999). Factors in Organic Farmers' Decision Making: Diversity, Challenge, and Obstacles. *American Journal of Alternative Agriculture, 14*(1), 2-10.

Dwyer, J. H. (1983). *Statistical Models for the Social and Behavioral Sciences.* New York, NY: Oxford University Press.

Estes, E., Kleese, T., Lauffer, L., & Director, E. (2003). *North Carolina Organic Vegetable Production Cost Study*: Department of Agricultural & Resource Economics, North Carolina State University.

Evenson, R. E. (1981). Benefits and Obstacles in Developing Appropriate Agricultural Technology. In C. K. Eicher & J. M. Staatz (Eds.), *Agricultural Development in the Third World* (pp. 348-361). Baltimore, MD: Johns Hopkins University Press.

Fairweather, J. R. (1999). Understanding How Farmers Choose between Organic and Conventional Production: Results from New Zealand and Policy Implications. *Agriculture and Human Values, 16*(1), 51-63.

FAOSTAT. (2009). Agricultural Data. Retrieved December 20, 2009, from http://faostat.fao.org/site/339/default.aspx

Fischer, R. (1982). Der andere landbau: Hundert Bio-Bauern und Gartner berichten uber ihre Bwweggrunde, Arbeitsweisen und Erfahrunge [Organic Farmers' Report: Its Function and Farmers' Experiences] (Zurich: Verlag Buchhandlung Madliger-Schwab).

Fischer, P. (1989). *Barriers to the Adoption of Organic Farming in Canterbury* (Master's Thesis). Lincoln University, Lincoln, New Zealand.

Fitz-Gibbon, C. T. and Morris, L. L. (1987). *How to Design a Program Evaluation,* London, U.K.: SAGE Publications.

Fliegel, F. C. (1984). Extension Communication and the Adoption Process. In B. E. Swanson (Ed.), *Agricultural Extension: A Reference Manual: Second Edition.* Rome, Italy: Food and Agricultural Organization of the United Nations.

Francis, J., Eccles, M., Johnston, M., Walker, A., Grimshaw, J., Foy, R., et al. (2004). *Constructing Questionnaires Based on the Theory of Planned Behavior: A Manual for Health Services Researchers*. Newcastle, U.K.: Centre for Health Services Research.

Fujimoto and Matsuda (2005). *Seeking of Alternative Agriculture.* Tokyo, Japan: Tokyo

University of Agriculture Press.

Fujimoto, A. and Abdullah, K. (2001). *Highland Vegetable Cultivation in Indonesia.* Tokyo, Japan: World Planning Co., LTD.

Fujimoto, A. and Miyaura, R. (1996). An Ecological and Economic Assessment of Vegetable Cultivation in Highland Areas in Southeast Asia. *Japanese Journal of Agricultural Science, 40*(4), 248-263.

Fujimoto, A. and Miyaura, R. (1997). Farm Management Appraisal of Tumpang Sari Vegetable Cultivation in Highland West Java- A One Year Study of Farmers' Practices in Cipanas. *Japanese Journal of Agricultural Science, 40*(4), 211-228.

Gujarati, D. N. (1995). *Basic Econometrics: Third Edition.* New York, NY: McGraw-Hill.

Hayami, Y., & Kawagoe, T. (1999). Middlemen in a Peasant Community: Vegetable Marketing in Indonesia. In M. Aoki & Y. Hayami (Eds.), *Communities and Markets in Economic Development* (pp. 129-152). New York, NY: Oxford University Press.

Hefferman, W. (1984). *Assumptions of the Adoption/Diffusion Model and Soil Conservation.* Paper presented at the RCA Symposium: Future Agricultural Technology and Resource Conservation, Washington D.C.

Henderson, E. and Van En, R. (1999). *Sharing the Harvest: a Guide to Community Supported Agriculture.* White River Junction, VT: Chelsea Green Publishing.

Hensher, D. A., and Johnson, L. W. (1981). *Applied Discrete Choice Modeling.* London: Croom Helm.

Hilman, Y., Suwandi, S., and Asandhi, A. A. (1990). *Efisiensi Penggunaan Pupuk Padaanaman Sayuran* [Effective Use of Fertilizer for Vegetables]. Makalah Disampaikan pada sminar efisiensi pupuk 12-13 November 1990. Pusat Penelitian Tanah dan Agroklimat.

Holbert, R. L. and Stephenson, M. T. (2002). Structural Equation Modeling in the

Communication Sciences, 1995-2000. *Human Communication Research, 28(4).* 531-551.

Holdcroft, L.E. (1984). The Rice and Fall of Community Development, 1950-65: A Critical Assessment. In Eicher, C. K. & Staatz, J. M. (Eds.), *Agricultural Development in the Third World* (pp. 46-58). Baltimore, MD: Johns Hopkins University Press.

Honda, T. (2007). Path Analysis of Factors behind Ineffectiveness of Wildlife Control Fences. *Journal of the Japanese Forest Society, 89*(2), 126-130.

Indonesian Center for Agriculture Socio Economic and Policy Studies. (2008). Revitalizing Agricultural Extension. Retrieved December 20, 2009, from http://pse.litbang.deptan.go.id/eng/index.php?option=com_content&task=view&id=232&Itemid=157

ISSAAS. (2003). *Journal of the International Society for Southeast Asian Agricultural Sciences 9 (3),* Tokyo: Academic Frontier Research Center, Tokyo University of Agriculture.

ISSAAS. (2005). *Journal of the International Society for Southeast Asian Agricultural Sciences 11 (3),* Tokyo: Academic Frontier Research Center, Tokyo University of Agriculture.

JIRCAS. (2005). *Evaluation of Vegetable-Based Farming Systems and Improvement of Vegetable and Fruit Cultivation in Highland Regions of West Java, Indonesia.* Tokyo: JIRCAS.

Johnson, G. I., Weinberger, K., and Wu, M. H. (2008). *The Vegetable Industry in Tropical Asia: Indonesia.* Tainan, Taiwan: The World Vegetable Center.

Kantor Desa Banglih. (2007). [Statistics of Bangli Village in 2007]. Unpublished raw data.

Kantor Desa Sukagalih. (2007). [Statistics of Sukagalih Village in 2007]. Unpublished raw data.

Kaplan, D. (2000). *Structural Equation Modeling: Foundations and Extensions*. London, U.K.: Sage Publications.

Kawai, S., Susila, W., Takahashi, N., & Nemoto, H. (2003). The Strategy for the Pest Control of Highland Vegetables by Conservation of natural Enemies in Candikuning, Bali, Indonesia. *Journal of the International Society for Southeast Asian Agricultural Sciences, 9*(3), 78-89.

Kearl, B. (1991, March 28-30). Evolution in Thinking about the Extension Function. Paper based on the meeting of the Association for International Agricultural and Extension Education, St. Louis, Missouri.

Kim, M., & Hunter, J. E. (1993). Attitude-Behavior Relations: A Meta-Analysis of Attitudinal Relevance and Topic. Journal of Communication, 43(1), 101-136.

Kommerskollegium National Board of Trade. (2003). Market Access for Organic Products from Developing Countries; Analysis of the EC Regulation (2092/91). Stockholm: Kommerskollegium National Board of Trade.

Koshio, S. (2004). Organizing an Interview. *The Public Speakers' Page*. Retrieved December 20, 2009, from http://www.hawaii.edu/mauispeech/html/interviewing.html

Leedy, P. (1993). *Practical Research, Planning and Design*. Columbus, OH: Merrill.

MacCallum, R. C., and Austin, J. T. (2000). Applications of Structural Equation Modeling in Psychological Research. *Annual Review of Psychology, 51,* 201-226.

McCann, E., Sullivan, S., Erickson, D., and Young, R. D. (1997). Environmental Awareness, Economic Orientation, and Farming Practices: A Comparison of Organic and Conventional Farmers. *Environmental Management, 21*(5), 747-758.

Mather, D., Bernsten, R., & Maredia, M. (2002). Ex-Ante Assessment of The Impact of Disease-Resistant Cucurbits Germplasm in Indonesia and South Africa. Michigan State University, Department of Agricultural, Food, and Resource Economics.

Maunder, A. H. (1973). Agricultural Extension: A reference Manual (Abridged edition). Rome, Italy: Food and Agricultural Organization of the United Nations.

Michelsen, J., Lynggaard, K., Padel, S., & Foster, C. (2001). *Organic Farming Development and Agricultural institutions in Europe: A Study of Six Countries: Economics and Policy, vol 9.* Hohenheim, Germany: University of Hohenheim.

Midmore, P., Padel, S., McCalman, H., Isherwood, J., Fowler, S., & Lampkin, N. (2001). *Attitudes towards Conversion to Organic Production Systems: A Study of Farmers in England.* Wales, U.K.: Institute of Rural Studies, University of Wales.

Miyaura, R., Suryadi, A. M., and Fujimoto, A. (1998). Vegetable Cultivation Practices and Cost in Tropical Highland: A Case Study of Highland Bali, Indonesia. *Journal of Agricultural Development Studies, 9(1),* 51-61.

Molyneaux, J. M. and Rosner, L. P. (2004). Changing Patterns of Indonesian Food Consumption and Their Welfare Implications. Working Paper 15. Indonesian Policy Program, BAPENAS/Department of Agriculture/USAID/DAI Food Policy Advisory Team. Retrieved December 20, 2009, from http://www.pdf.dec.org/pdf_docs/Pnade890.pdf

Mundy, P. G. W. (1992). *Information Sources of Agricultural Extension Specialists in Indonesia* (Doctoral dissertation). The University of Wisconsin, Madison, WI.

Narioka, H., Mastur, I. W., Adnyana, S., and Medina, S. M. (2001). Biophysical Characteristics and Cropping Systems in Highland Slope Farming. In A. Fujimoto & K. Abdullah (Eds.), *Highland Vegetable Cultivation in Indonesia* (pp. 153-172). Tokyo, Japan: World Planning Co., LTD.

National Science Foundation. (2002). *The 2002 User-Friendly Handbook for Project Evaluation.* Arlington, VA: National Science Foundation.

National Westminster Bank. (1992). *NatWest National Farm Survey*, U.K., Conventry: National Westminster Bank.

Nourin Tokei Kyokai. (1995). Indonesia no Yasai. [Vegetables in Indonesia: Producing, Marketing, Consuming, and Trading]. Tokyo, Japan: Nourin Tokei Kyokai.

Novianty, D., and Andoyo, R. (2005). *Organic Market in Indonesia*. Unpublished manuscript.

Nowak, P. J. (1982). *Adoption and Diffusion of Soil and Water Conservation Practices*. Paper presented at the RCA Symposium: Future Agricultural Technology and Resource Conservation, Washington D.C.

Okumura, N. (2004). Beikoku ni okeru CSA undou no tayouka: Seisansya to shouhisya kaiinn no kankeisei no henka [Diversification of the CSA Movement in the United States: Changes in the Relationship between Producer and Consumer Members]. In Nihon Yuuki Nougyou Gakkai (Eds.), *Yuukinougyou Nenpou vol.4* (pp. 207-219). Tokyo, Japan: Commons.

Padel, S. (2001a). Conversion to Organic Farming: A Typical Example of the Diffusion of an Innovation? *Sociologia Ruralis, 41*(1), 49-61.

Padel, S. (2001b). *Conversion to Organic Milk Production: The Change Process and Farmers' Information Needs* (Doctoral dissertation). University of Wales, Dyfed, U.K.

Padel, S. and Lampkin, N. H. (1994). Conversion to Organic Farming: An Overview. In N. H. Lampkin & S. Padel (Eds.), *The Economics of Organic Farming: An International Perspective* (pp. 295-313). Wallingford, U.K.: CAB-International.

Padel, S., Lampkin, N., and Foster, C. (1999). Influence of Policy Support on the Development of Organic Farming in the European Union. *International Planning Studies, 4*(3), 303-315.

Pindyck, R. S., and Rubinfeld, D. L. (1998). *Econometric Models and Economic Forecasts. Fourth Edition.* Boston, MA: Irwin/McGraw-Hill

Prawoto, A., & Surono, I. (2005). Organic Agriculture in Indonesia: A Wannabe Big Player in the Organic World. *The Organic Standard, 49,* 3-6.

Reardon, T. (2004). Supermarkets and Agricultural Development in Indonesia: First Impressions. Unpublished manuscript.

Rockwell, K. (1996). Evaluating Program Impact. Unpublished manuscript.

Rogers, E. M. (1995). *Diffusion of Innovations*. New York, NY: Free Press.

Rogers, E. M. and Shoemaker, F. F. (1971). *Communication of Innovations: A Cross-Cultural Approach.* New York, NY: Free Press.

Rudi. (2005). *Potensi pengembangan ekonomi local berbasiskan usahatani sayuran organic di desa Sukagalih kecamatan Megamendung kabupaten Bogor* [Local Economic Development Potential Based on Organic Vegetable Farming in the Sukagalih Village, Sub-District of Megamendung, District of Bogor.] (Bachelor's thesis). Bogor Agricultural University, Jawa Barat, Indonesia.

Soil Association (2000). *The Organic Food and Farming Report 2000.* Bristol, U.K.: Soil Association Certification Ltd.

Schultz, T. W. (1964). *Transforming Traditional Agriculture.* New Haven, CT: Yale University Press.

Smalley, S. B. (2000). *The Emergence of Stakeholder Consensus: Examining Issues in Sustainable Agriculture Research and Education* (Doctoral Dissertation). Michigan State University, East Lansing, MI.

Staatz, J. M., and Eicher, C. K. (1998). Agricultural Development Ideas in Historical Perspective. In C. K. Eicher & J. M. Staatz (Eds.), *International Agricultural Development* (pp. 8-38). Baltimore, MD: Johns Hopkins University Press.

Sudana, M., and Temaja, I. G. R. M. (2002). *Input and Output Analysis of Organic and Conventional Farming System in the Highland of Bali.* Paper presented in ISSAAS International Symposium, Tokyo, Japan.

Sudana, M., Temaja, I. G. R. M., Miyaura, R., and Fujimoto, A. (2003). Cultural Practices and Economic Analysis of Organic and Conventional Vegetable Farming in Bali, Indonesia. *Journal of International Society for Southeast Asian Agricultural Sciences, 9*(3), 104-113.

Sulaiman, R., and Hall, A. (2004). *Extension Policy at the National Level in Asia.* Paper presented at the 4th International Crop Science Congress, Brisbane, Australia.

Sumiartha, K., Susila, W., and Sudiarta, P. (2005). *Effect of "Selasih" (Ocimum tenuiflorum) Plant Oil on Fruit flies (Bactrocera dorsalis complex) in Long Chili. Journal of International Society for Southeast Asian Agricultural Sciences, 11*(3), 46-50.

Surono, J. I. (2007). Country Case Study of Indonesia. Power point document presented at the Regional Conference on Organic Agriculture in Asia, Bangkok, Thailand.

Suvedi, M. and Morford, S. (2003). *Conducting Program and Project Evaluations: A Primer for Natural Resource Program Managers in British Colombia.* Kamloops, B.C.: Forum for Research and Extension in Natural Resources.

Suvedi, M., Heinze, K. & Ruonavaara, D. (1999). *How to Conduct Evaluation of Extension Programs.* East Lansing, MI: ANRECS Center for Evaluate Studies, Michigan State University Extension.

Swanson, B. E., and Claar, J. B. (1984). The History and Development of Agricultural Extension. In B.E. Swanson (Ed.), *Agricultural Extension: a reference manual* (pp.1-19). Rome, Italy: Food and Agriculture Organization of the United Nations.

Syaukat, Y. (2003). Factors Affecting Farmers in Adopting Low-Input Rice Farming System in Tempuran Sub-District, Karawang, Indonesia. *Journal of International Society for Southeast Asian Agricultural Sciences, 9* (3), 90-103.

Syaukat, Y. (2006). Potential Development of Organic Vegetables in Sukagalih Village, Megamendung Subdistrict, Bogor, West Java. In *Development of New Bio-Agents for Alternative Farming Systems: 2005 Report* (pp. 194-205). Tokyo, Japan: Tokyo University of Agriculture.

Tanaka, J. S. (1987). How Big is Enough?: Sample Size and Goodness of Fit in Structural Equation Models with Latent Variables. *Child Development, 58,* 134-146.

Tashakkori, A., and Teddlie, C. (1998). *Mixed Methodology: Combining Qualitative and Quantitative Approaches.* Thousand Oaks, CA: Sage Publications.

Taylor-Powell, E. (1996). *Sampling.* WI: University of Wisconsin-Extension.

Tmanov, A. (2001). *Case Study of the Ukrainian Agricultural Advisory Services* (Doctoral Dissertation). Pennsylvania State University, University Park, PA.

Toyota, H. (1998). *Kyobunsankouzoubunseki: Nyumonhen* [Structural Equation Modeling]. Tokyo, Japan: Asakurashoten.

Umali-Deininger, D. (2005). *Improving Delivery of Extension Services to Rural People: New Perspectives.* Paper presented in the SEARCA Conference "Agricultural and rural development in Asia: Ideas, paradigms, and policies three decades after," Manila, Philippines.

UPTD Penyuluhan Wilaya Ciawi. (2007). [Statistics of Sukagalih Village in 2007]. Unpublished raw data.

UPTD Pertanian Tanaman Pagan Kec. Batriti. (2007). [Statistics of Bangli Village in 2007]. Unpublished raw data.

United States Embassy in Jakarta. (2006). *Indonesia: Trade and Investment Highlight September - November 2006.* Retrieved December 20, 2009, from http://jakarta.usembassy.gov/econ/Trade%20and%20Investment%20Highlights%20Sep-Nov%2006.pdf

Vanclay, F. and Lawrence, G. (1994). Farm Rationality and the Adoption of Environmentally Sound Practices: A Critique of the Assumptions of Traditional Agricultural Extension. *European Journal for Agricultural Education and Extension 1*(1), 59-90.

Weiss, C. (1998), *Evaluation: Second Edition.* Upper Saddle River, New Jersey: Prentice

Hall.

Willock, J. (1994). Decision-Making on Family Farms. In B. H. Jacobsen, D. E. Pedersen, J. Christensen & S. Rasmussen (Eds.), *Farmers' Decision Making a Descriptive Approach.* (pp. 63-75). Copenhagen, Denmark: Institute for Agricultural Economics and Royal Veterinary and Agricultural University.

Witono, A., Nonaka, N., Kosugi, S., and Mayrowani, H. (2005). Analysis and Evaluation of Marketing Systems for Temperate Vegetables in West Java, Indonesia. In Koyama, O. (Ed.), *Evaluation of Vegetable-Based Farming Systems and Improvement of Vegetable and Fruit Cultivation in Highland Regions of West Java, Indonesia.* (pp. 117-122). Tokyo, Japan: Japan International Research Center for Agricultural Sciences.

Wooldridge, J. M. (2000). Introductory Econometrics: A Modern Approach. Mason, OH: South-Western college publishing.

Yamazaki, K. (2005). Ecological Balance in Alternative Farming. In *Research of Alternative Farming Methods* (pp. 7-17). Tokyo, Japan: Tokyo Nodai Shuppankai.

Yarbough, J. P., Tait, J. L., Wibe, J. A., and Beanlieu, L. J. (1992). *Communication Process andLleadership.* Gainesville, FL: Florida cooperation extension service, University of Florida.

Zakaria, A. (2003). *Decentralizing Extension to Local Government: Indonesia Experience.* Paper presented at the Regional Workshop on Operational zing Reform in Agricultural Extension in South Asia, New Delhi, India.

Zhou, S., Herzfeld, T., Glauben, T., Zhang, Y., and Hu, B. (2008). Factors Affecting Chinese Farmers' Decisions to Adopt a Water-Saving Technology. *Canadian Journal of Agricultural Economics 56 (1),* 51-61.