Potentials and challenges in farming and food systems of globalgap rice in the mekong delta of vietnam

nguyen ngoc thanh

Norwegian University of Life Sciences
Department of Plant and Environment Sciences
Master Thesis 30 credits 2012

Abstract

Vietnam contributes remarkably with its rice production to export to many countries on the world. Rice cultivation has been started since long time in Vietnam, and today being the second largest exporter in the world. Producers apply more and more fertilizer and pesticide on their rice fields to gain high yield besides of integrating advanced technologies such as sowing with low density, integrated pest management and pathogenous resistant rice. The rice production causes many problems of health and has negative impact to the environment. Today, small-scale production is confronted with many obstacles for improving rice quality. To analyse this, a case study was designed to explore Globalgap rice production for the Mekong Delta of Vietnam. The Globalgap production translates customers' requirements into agricultural production practice to improve mainly food safety and quality on global markets. It is investigated how rice cultivation could be altered, but also what are the present habits of rice consumption as well as effects on the environment. Thanks to Checkland's SSM, complex situations of rice farming and food systems were expressed in rich pictures and SWOT analysis where used to the complex systems. Research shows that the Globalgap rice production changes the past habits to rice sowing with lower density, applying less fertilizers and pesticides and improving quality rice production. Moreover, the producers became aware to better protect their health and the environment. However, the Globalgap rice could not meet diverse customers because its price is high compared with other popular rice.

Table of contents

List of abbreviations

AusAID	Australian Government Overseas Aid Program
BMPs	Best management practices
DARD	Department of agriculture and rural development
FAO	Food and Agriculture and Organization
GAP	Good agricultural practice
Globalgap	Global good agricultural practice
GSO	General Statistics Office of Vietnam
HDRA	The Henry Doubleday Research Association
IFA CPCC	Integrated farm assurance control points and compliance criteria
IFA GR	Integrated farm assurance general regulations
MARD	Ministry of agriculture and rural development
PANO	People's army newspaper online
SSM	Soft system methodology
TFVU	The fresh vegetables union
USDA	United States Department of Agriculture
VFA	Vietnam food association
WFP	World food programme

1. Introduction

Rice is main food of Asia and part of the Pacific of Latin America area. In there, Asia is the biggest rice producer. Accounting for over 90 percent of the world's rice is produced and consumed in the areas (FAO 2000). Moreover, rice not only plays an important role for food security, but brings profit for economic of many countries (FAO 2012a). In addition, rice is used as ready food for preventing or treating malnutrition (WFP 2010). There are about 114 countries that have cultivated rice on the world (FAO 2011). The most of the Asian countries such as China, India, Bangladesh, Vietnam, Thailand and etc., have the largest rice production. Moreover, the world production of rice would reach 718.3 million tons in 2011 (478.9 million tons of milled rice). The production increased generally yearly from 457.9 million tons of milled rice in 2008 to 480 million tons of milled rice in 2011 (FAO 2012a). Otherwise, the production has supplied a large amount of milled rice yearly to meet food demand for many importing countries such as Indonesia, Iran, Iraq, Nigeria, Brazil, South Africa, Japan and Malaysian (USDA 2012). However, the production has not still been enough to contribute to feed the world. There is about over one billion hungry people worldwide (WFP 2010). The proportion of hungry people whose have income less than 1$ a day concentrates mostly in Sub-Sahara Africa, Southern and Eastern Asia, Latin American and the Caribbean (UN 2010).

Therefore, forecast for rice importing demand of these countries would be higher and higher although the major countries of paddy rice production have not stopped to enhance rice yield and area (FAO 2011). The area of paddy rice cultivation in developing countries will increase to 164 million hectares in 2030 compared with the current feature only about 160 million hectares (Faurès et al. 2012). However, the global climate change had negative impaction on rice production in many Asian countries by flood, monsoon and global warming, particular in Cambodia, Philippine, Pakistan, Japan, Korea and etc., and impacted remarkably in Australia, China and Thailand (FAO 2012a). Besides, the negative impacts of the climate change causes climb of rice price by higher cost of basic inputs in rice production. In addition, with increasing population and improving life standards, the demand of rice consumers has asked higher and higher both quantity and quality. For instance, the prediction for the milled rice consumption of the world will rise about 490 million tons in 2020 to around 650 million tons in 2050 (Roderick et al. 2012). To maintain current rice yield and higher and higher consumption of rice, producers have used more and more chemical synthetic fertilizers, pesticides, modern rice varieties and advanced technology (FAO 2000).

Parallel of the efforts, policies of developing sustainable agriculture in many countries such as Caribbean, Burkina Faso, Colombia, Kenya, Namibia, South Africa and Thailand was deployed to raise healthy food for customers and animals, which did not harm environment. The policies contributed conservation and preservation of resources of natural environment such as soil, water and air (FAO 2005). Besides, the sustainable agriculture also created biodiversity and animal's welfare. Moreover, the development built up economical and social viability (FAO 1995). To meet the sustainable development, many standards of production such as Good Agricultural Practices (GAP), Best Management Practices (BMPs) or Organic production was established to improve food quality and safety, workers' health and environment preservation through out improvement of practical management on farming systems. For example, requirements of GAP standard indicate sustainable development of environment, economic and social elements. The standard of GAP production ensures food safety and quality, economic viability and environment friendly (FAO 2008). Besides, BMPs practices results in reduce amount of agricultural pollutants going into ground water and surface water. A case study of rice BMPs in Louisiana showed that the rice producers minimized the pollution of water resources by runoff reduction from applying the best management practices (Saichuk et al. 2000). Moreover, organic agriculture focuses on enhancement and promotion of biodiversity, biological cycles and soil biological activities through practical management of farming system. The organic production is considered on potential environment and social activities by excluding use of synthetic inputs. Besides, organic products are demonstrated through certification and label. The organic production system reduces pollution of groundwater and creates landscape with biodiversity. Moreover, the production helps farmers reach sustainable agricultural development that also improve their health and economic self-reliance (FAO 2012b)

Nowadays, many countries have started to put the GAP standard in the farming and food system such as integration of pest management, nutrient management and agriculture conservation (FAO 2003). Moreover, to meet globalization of consumers' food demand, global good agricultural practice (Globalgap) reassure customers' requirements about process of producing food on the farms around the globe, reducing negative impacts of farm activities on environment and decreasing use of chemical inputs as well as improving worker health and work conditions. The Globalgap standard is exhibited by Globalgap series. The exhaustive document of the series is divided into six groups.

- Integrated farm assurance standard
- Compound feed manufacturer standard
- Animal transport

- Plant propagation material standard
- Risk assessment on social practice
- Chain of custody

Each group contains complement factors inside. Depending on the producers' purposes, complement elements are chosen to create a manual of the Globalgap production process. The choices produce directions to implement of standards for the Globalgap certification process. The direction includes general regulations, control points, checklist, national interpretation guidelines, guidelines and supporting documents and benchmarking cross-reference checklist (GLOBALG.A.P 2011a)**.**

There are over 100 countries in five continents that are certificated by Globalgap standard followed production. The total number of producers by Globalgap standard gained 112.600 certifications in 2011 (GLOBALG.A.P 2011b)**.** For example, some countries in Asia are China, India, Indonesia, Iran, Japan and Vietnam. India has the largest number of Globalgap producers with 3,092 certifications while Iran only has one of the Globalgap certification. The Africa countries are Cameroon, Egypt, Ethiopia, Ghana and Kenya. Kenya has the noticeable number of 1,070 Globalgap certifications. Some counties in North America are Canada, Cuba, Dominican Republic, Mexico, United States and Jamaica. In the South America, Peru has the remarkable Globalgap certifications of 2,566 compared with Brazil, Chile, Colombia and Ecuador. The Europe has the largest number of countries and occupies 74% of all Globalgap certifications in the world such as Belgium, Belarus, Czech Republic, France, Germany, Greece, Hungary, Macedonia, Malta, Moldova, Norway, Italy, Ireland, Lithuania, Spain and Sweden while the Oceania has the lowest number of Globalgap certificated countries are Australia and New Zealand (GLOBALG.A.P 2011b).

Vietnam is one of the countries that adopt voluntarily international quality standards to initially integrate into world markets (Eilers 2009). There are about 250 Globalgap certifications in Vietnam (GLOBALG.A.P 2011b). For example, production of rice, pangasius fish and fruits such as grapefruit and star apple are applied by process of the Globalgap standard. However, the production with the Globalgap standard has been facing many difficulties and challenges for farmers, especially in outlet markets and production systems (MARD 2010). Besides, most of the rice producers in the Mekong Delta are not still familiar to the Globalgap standard followed production. Anyhow, the Globalgap rice production has started in some provinces among twelve provinces and a central city of the Mekong Delta. For example, the Hoa Loi cooperative has started cultivating the Globalgap rice by a model of rice-shrimp combination with hectares since

year 2010 (Duyen 2011). Besides, the rice cultivation in Chau Phu and Thoai Son district of An Giang province was also granted the Globalgap certification in August 2010. Moreover, the Phuoc Trung cooperative in Chau Thanh district of Hau Giang province was also certificated by the Globalgap rice production at the beginning of year 2011. The rice production gaining Globalgap standard is earliest and the most successful is located in My Thanh cooperative of Cai Lay district in Tien Giang province where the farming of the Globalgap rice is explored by the thesis. The producers in the My Thanh cooperative were granted cetification of Globalgap rice production in February 2009 (Eilers 2009). Moreover, the models of the Globagap production asked association of many stakeholders and applied many production regulations. The participation of self-producers could not afford to run on the Globalgap production because the certificated process was very complex and costly. Furthermore, the outlet market of the Globalgap rice is unstable (MARD 2010).

Hence, I think that the farmers apply production of advanced technology to gain quality rice of the Globalgap standard, but if the customers' demand is not enough strong by lack of competitiveness in market, or the the Globalgap rice production cannot be approached to the diversity of customers by high expenses of production system. As a result, the consumption market and the area of the Globalgap rice cannot widen in future. In order to explore the issues and reasons that result in barriers for sustainable development of the Globalgap rice production, by individual initiative, the thesis is conducted to consider how situation of the Globalgap rice production has contributed to development of rural sustainable agriculture in considering aspects of society, economy and environment in the Mekong Delta of Vietnam. Specifically, objectives of the thesis are to explore the followed questions:

- Which stakeholders receive mostly advantages from the Globalgap rice production?
- Does the situation of Globalgap rice production really contribute environment preservation?
- Is Globalgap rice production an effective alternative to agricultural practice and food consumption for rural development in the Mekong Delta of Vietnam?

In order to understand more about the studied issues, the specific research questions are figured out in details below:

For study case of social aspects:

- How has the production of GlobalGap rice affected agricultural practices of the producers as well as culture of food consumption and food process?
- Has the production of GlobalGap rice positively or negatively impacted rice production of non-GlobalGap farmers? What will the non-GlobalGap farmers expect perspective from impactions of GlobalGap rice production?

- What has the production of GlobalGap rice contributed to food quality in Mekong delta? Especially whether or not GlobalGap rice food is used in canteens of schools, hospitals and food shops for children?

For economic aspects:

- How has the production of GlobalGap rice influenced to economic viability of farmers (enhancing income from increasing yield, reducing dependence on external inputs, improving technology of farming system, sufficient profit from good markets…etc.). Especially considering in small-scale farms? What are the benefits of the farmers applying Global good agricultural practices?
- Has market networks of GlobalGap rice affected to customers' purchase of rice price?

For environment aspects:

- Has the cultivation of GlobalGap rice affected resources used compared to non-GlobalGap agricultural production, considering use of fertilizer, pesticides, herbicides, conservation of soil, water and air and local resources?

The questions make main research questions become obvious in carried out steps. Moreover, the thesis will expose vision 2020 that might be useful for improvement or changes of rice production system prospectively.

2. Methodology
2.1. Soft system methodology

Thanks to Checkland's Soft system methodology *(SSM)*, the complex systems of the Globalgap rice production were explored holistically by using the soft system methodology. The problem situations were considered with contrasting views and may different ideas. Besides, the advantage of the soft system could integrate human factor into problematic areas. Moreover, the soft system methodology helps the analysis reach perspective aspects of environment, economic and social of the exploring systems (Wilson and Morren, 1990). The analysis is considered on focal points of interactive relationships and associations such as flow of inputs and outputs.

The thesis is carried as a case study of exploring the Globalgap rice production system in the My Thanh cooperative. This is not only the first cooperative of the Globalgap rice production in the Mekong Delta, but also the potential cooperative in the Mekong Delta in the studied period. In order to analyse and understand the current and future wanted situations, the case study only used three first steps within seven steps of the SSM (Figure 1). The description is also fundament to develop a vision in 2020 as the future wanted situation. A part of the SSMs' steps indicates three first steps below.

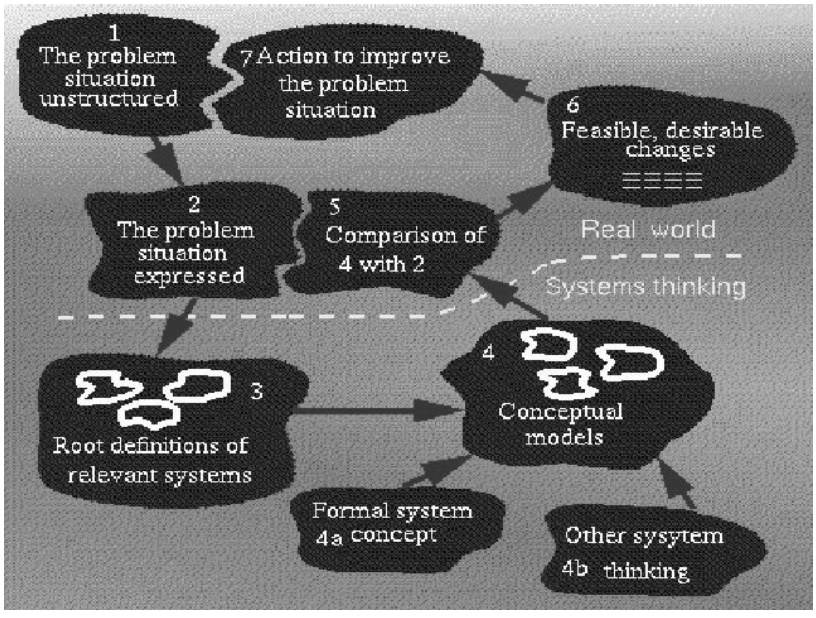

Figure 1: Seven step of Checkland's Soft system methodology (Source: Couprie et al. 2012)

Step 1: Exploring the problem situation unstructured by interviewing concerned stakeholders in the farming and food system of the Globalgap rice production in the My Thanh cooperation. Besides, there is visit of actual state of production systems to understand the current situation.
Step 2: Expressing problematic areas. The actors and their roles are defined. The collected information in the first step is organized to analyse the problem situations. Then, the analysis is outlined in the rich picture.
Step 3: Identifying key issues by analysing the SWOT that process for dealing with studied areas.

In order to take a look about the future wanted situations, the visioning 2020 is a group exercises of the Globalgap farmers. The exercise is called "everyone a teacher, everyone a learner" (Cater et al. 1995). The participants are divided into five groups with different roles of stakeholders such as the roles in government, scientists, producers, businessmen and consumers. The group work discusses about given topics that are related the role of each stakeholder. The topics principally focus on the visioning 2020 of rice production in My Thanh cooperative. After discussing the topic of the visioning 2020, each group shows their thinking and ideas in front of the workshop.

2.2. Exploring the current situation of the farming and food system of the Globalgap rice production in the My Thanh cooperation

2.2.1. Interviews

In other to understand about the current situation of the Globalgap rice production and its food chain, a case study was started in January 2012. A trial-interview was conducted with three first Globalgap farmers to understand preliminary situation of the Globalgap production system. The first meetings were useful to create a thorough questionnaire (Appendix 1) that was suitable for get information better from many different farmers of both Globalgap and non-Globalgap production because the farmers were different from their education levels, ages, and professional experience. Interviewing the farmers was classified into two stages. The core stage concentrated Globalgap farmers who have taken place the Globalgap rice production. The interviews were conducted with 15 Globalgap farmers within 5 groups of the Globalgap rice production in My Thanh Nam commune (Appendix 2). Each group consists of the farmers who have land area of rice production closely. Each group was chosen about three farmers to interview. Sudden and random appointments with the Globalgap farmers in each group were conducted thanks to relationship of an engineering worker for the Globalgap rice project. It was not easy to contact the farmers. Therefore, the interviewing only happened in 4 groups of the My Thanh cooperative

in My Thanh Nam commune. They often visit their rice field every morning and are busy with their other personal work. The engineering worker and I often made a call phone to the farmers after they might finish their field visiting. The rest stage interviewed non-Globalgap farmers who do not produce or used to cultivate rice with Globalgap standard. The interviews are carried out with 5 non-Globalgap farmers (Appendix 3). Each non-Globalgap farmer is chosen randomly. In addition, his or her rice field is located closely with a group of the Globalgap production in My Thanh Nam commune. The purpose of interviewing both Globalgap and non-Globalgap farmers was to know whether Globalgap production affects negative or effective non-Globalgap producers and also to recognise barriers and obstacles of the Globalgap production in association of the four stakeholders such as government, scientist, farmer and businessman. Besides, other interviews were conducted to be more understandable about the faming system of the Globalgap rice. I interviewed the leader and an agricultural officer in Department of Agriculture and Rural Development of Cai Lay district. They play main role as stakeholders of district government. Furthermore, I met a scientific stakeholder who play direct role of advice to build the manageable system of the Globalgap standard followed production (Appendix 4). For exploring the food system of the Globalgap rice, I visited two lead staffs that are responsible for business and production technology of the Globalgap rice in the ADC enterprise. In addition, the interviews were conducted with two salespeople of the ADC Company who are directly responsible for Globalgap rice business between retail stores and the ADC Company. In order to understand about Globalgap rice business and customers' demand, I started to meet three retailers of Globalgap rice and two retailers of non-Globalgap rice in Ho Chi Minh city (Appendix 5). Moreover, I planed to meet stakeholders in kindergarten, hospital and children's food shops to find out about food made with rice; however, they are too busy to make an appointment. Therefore, I only interviewed one manager of kindergarten in Ho Chi Minh city to explore their demand about the rice of high quality.

2.2.2. Rich picture

Rich picture is a tool for the SSM that shows internal and external relationships and connections of problematic situation (Horan 2000). The rich picture focuses on important information, but not all of collected information that helps to analyse and understand complexity systems holistically. Besides, considering the relationships can make some improvement from the current situation. In order to describe about the current farming and food system of the My Thanh cooperative, the designer firstly needs being reminded all collected information that related to the complex situation of the farming and food system. Secondly, designer looks about elements

of structure in the complex situation. For example, identification of stakeholders is direct or indirect people, institution, group or organization that affect or is affected in the explored situations. The roles of the stakeholders are also determined clearly. Besides, the other factors such as geographic localities, physical equipment and so on are also considered in the elements of the structure. Thirdly, a look about the elements of process in the problem situation is also written down. The elements are the flow of goods, energy, work, data or activities that are going on and so on. Then, the designer considers the ways that the structure and the process interact each other. The designer uses symbols, keywords, icon and pictures to depict the interaction and relationship within the farming and food system. During the process of creating the rich picture, the designer avoids using their objective ideas. The information should show factually and subjectively (Burke et al. 2012).

2.2.3. SWOT analysis

The farming system of the Globalgap rice in the My Thanh cooperative and its food system were evaluated through strengths, weaknesses, opportunities and threats (SWOT) analysis. The work is conducted separately on both the farming and food system after finishing the interviews with all stakeholders. The tool of the SWOT helps sort internal and external sections of the farming and the food system. The strengths and weaknesses are internal to the systems and the opportunities and threats show external sections (Zoler and Bruynis, 2007). The analysis is focused main problematic areas. The key issues discussed with participants in a workshop. The workshop was only organized with stakeholder group of the Globalgap farmers. The discussion helps get more information, feedbacks and ideas of change that are useful for improving the current situation of the Globalgap rice production in future.

3. Results
3.1. Current farming system of Globalgap rice in the My Thanh cooperative
3.1.1. Overview of Cai Lay district in Tien Giang province

Globalgap rice production of the My Thanh cooperative is located partly in My Thanh Nam and My Thanh Bac commune of Cai Lay district in Tien Giang province of the Mekong Delta of Vietnam. The Cai Lay is spread 436 km^2 with 28 political units of district and commune. Potential development is contiguous towards of east and northeast where they rose up of many schools, trading and service centers of jobs, explanation of industrial and industrial handicraft jobs and improvement of high-speed road. The population is about 327,000 people. The major development of agriculture is paddy rice, aquaculture and fruit trees such as durian, star apple, mangoes and many citrus fruits. In addition, the producers here altered rice cultivation from one crop a year into two or three ones per year. The areas of poor rice cultivation are transferred to vegetable farming. Besides of the production advantages, appearance of high flood peak causes damages for the crops. According to the survey of Hai (2012), the greatest peaks of flood happened without rule in Cai Lay district. The highest flood peaks repeated about 7 or 9 years once time from about 1.5-2.5m. Even, the damage of flood took place within three continuous years. Therefore, the prediction of great flood season meets many difficulties. Whereas constructed dikes in My Thanh Nam commune are not really high enough to prevent peak of flood. The current dikes can afford to prevent the small and coming late floods with the flood peak under 1.47m. On the other hand, there are trading markets that serve for consumption, good exchange and business in the center of the district. In addition, there are food shops and hotels, especially a famous temple of Chua Long Phuoc in the village of Long Khanh commune (Tien Giang 2012). The Cai Lay is not famous with tourisms areas. However, Cai Be floating market and Tan Phong Island that are closely located with the Cai Lay district are famous with many kinds of fruits, vegetables and trading culture on floating market (VTV Group 2012).

3.1.2. History of Globalgap rice production in the My Thanh cooperative

My Thanh Nam commune is a potential region of intensive rice production with three crops per year. Besides, the farmers here have experience of age-old traditional practice about the paddy rice. Therefore, it makes possible for the rice producers to adapt application of advanced technologies into farming system. By 2002, many farmers were trained to practice rice production methods such as “Seed Health”, “Public Mouse Management”, “Clean Rice Fields” and “Three down, Three up” (CDC 2012). The training was proposed to produce benefits from the “safe and high quality rice” programme. The programme was undertaken and managed by

Department of Agriculture and Rural Development of Tien Giang Province and Cai Lay District from year 2004 to 2006. Many technical advances such as row sowing, using of balanced fertilizer and biologic pesticides were used to not only help rice grow up better but also manage diseases and pests effectively. The changes brought the producers many profits from reducing inputs of seeds, fertilizers, pesticides and higher gained yield. In order to support productive organization and rice consumption system, the My Thanh cooperative was established in November 2004 by the farmers' desire in the My Thanh cooperative under advices and supports of Department of Agriculture and Rural Development of Cai Lay District. However, outlet market of the harvested rice was not stable and was not still guaranteed although the rice was produced by standard of safe and quality rice. National Office of Intellectual Property of Vietnam granted the certification of safe and high quality rice production in 2008. Moreover, the rice was sold to any trader, which did not have distinction between the rice of safe and quality production and normally produced rice outside. Anyhow, the program also improved the rice farming system and brought the producers additional income. Specifically, the rice production of the safe and high quality rice brought benefits from higher rice price, reduction of production expenses, Therefore, the profit increased about 15-20% compared with normal rice cultivation (Hai 2010).

In order to tackle outlet market, rice production by Globalgap standard has started under support of Department of Agriculture and Rural Department of Cai Lay District, Tien Giang Bio-Technology technical center and ADC enterprise since year 2008. However, the area of the Globalgap rice production was small by limited fund and strict regulations of the Globalgap standard. Then Department of Agriculture and Rural Department of Tien Giang province and Department of Technology and Science of Tien Giang planed to support the My Thanh cooperative (Hai 2010). The plan was to carry out as follows:

- Enlarging size of the Globalgap rice area of the My Thanh cooperative
- Enhancing manageable capability according to the Globalgap standard for the My Thanh cooperative
- Organising and advising guarantor stakeholders of the Globalgap rice to buy the Globalgap rice from producers of the My Thanh cooperative
- Contributing in build of new rural areas in Vietnam. The new rural areas are a national programme until 2015. The goal of the new rural areas is to develop sustainable economic, culture and society of about 20 percent numbers of communes in Vietnam (PANO 2012)

Besides, the association of the four stakeholders (Appendix 6) also plays a key role of the Globalgap rice production in the My Thanh cooperative. Each stakeholder contributes different roles in process of the Globalgap rice production. For example, local government is Department of Agriculture and Rural Department of Cai Lay District, which is responsible for guiding the producers to implement requirements of the Globalgap rice production. The producers are demanded to follow regulations in the Globalgap rice production to ensure safe and quality aspects for consumers, workers' health and working condition, environment friendly and especially to be able to trace back the farm origin of the produced rice. The main regulations are showed in details below (Hai 2010)

- The produced rice has to be safe for consumers. The Globalgap rice is not contained microorganisms such as bacteria, fungus, virus and parasitic organisms. In addition, the rice also is not hold chemical such as pesticide residues, heavy metal (such as arsenicum, cadmium, palladium, curium, zincum and hydrargyrum), nitrate and dioxin.
- The producers have to be ensured healthy and working condition. The producers are trained about how to use pesticides and agricultural machineries safely.
- The production activities are ensured not to influence environment around
- The harvested rice can be back the origin of the producers if there is any problem of food safety and hygiene.

Furthermore, the Globalgap rice production has to comply with 206 of primary mandatory control points and 126 secondary control points with fulfilled rate of 95 percent (CDC 2012). The points are the complied regulations based on Globalgap IFA GR Version 3.1_Nov09 and Globalgap IFA CPCC Version 3.0_Apr09 according to interview with a scientist stakeholder in Tien Giang Bio-Technology technical center. The Globalgap producers have to apply the regulations in their Globalgap rice production. Besides, the inspected and conducted process is written in text and is kept at least 2 years.

For the task of Tien Giang Bio-Technology technical center, the scientific stakeholder undertakes responsibility of advising directly in build of quality management system of Globalgap standard. Besides, the organization also invites the TÜV SÜD PSB Company that is organization of evaluation and granting Globalgap certification.

Besides, the My Thanh cooperative is also an organization that runs on directly the management system of the Globalgap rice production. The organization is a representative member of the My

Thanh cooperative and can sign the contract of rice guarantee with the ADC Company in each rice crop.

About the ADC Company, the stakeholder of guarantor and distributor supports a part of fund for The My Thanh cooperative at the beginning periods of the first two years. The fund is contributed into building infrastructure, analysis of rice sample and cost of evaluation and certification of Globalgap rice. Furthermore, the company guarantees directly all rice of the Globalgap standard with premium price.

3.1.3. Globalgap rice production activities of My Thanh cooperative

The My Thanh cooperative was established in 2004. The My Thanh cooperative is located the Cai Lay district. The two commune units of the Cai Lay districts are My Thanh Nam and My Thanh Bac where farmers here have participated in the cultivation of Globalgap rice. There were about 122 farmers of the two communes who joined to produce Globalgap rice with total area of 106 hectares in year 2009 whereas the area of the Globalgap rice is only about 96 hectares at the present (Hai 2010). The number of the farmers is also reduced at 107 farmers in the period. In there, the My Thanh Nam commune where the farming system is explored by the purpose of the thesis indicates about 50 hectares of the Globalgap rice. The fifty-six farmers here have cultivated the Globalgap rice. The principal production here is paddy rice with three crops a year because of rich source of water and alluvial soil from deposition of the Mekong rive partly (Tran 1997 cited in Estellès et al. 2002). Besides, the secondary production is cow, pig, duck and chicken husbandry. The animal husbandry of cows and pigs only takes place in a few households. The households can get extra income besides of the Globlgap rice's profit. Additionally, cultivating some fruit trees such as mangoes, jackfruits, bananas, coconuts in the garden are mainly used for food and less business.

In order to be easy for production management system, the Globalgap farmers in the My Thanh Nam were divides into 5 groups because the previous rice production area of each individual is small-scale and desultory. The Globalgap rice production requires that the areas of rice fields have to be adjoining together. The combinations of the close areas constitute one group of the Globalgap rice production with about 15 members of the cooperative.

The table 1 shows the periods and activities of take care the Globalgap rice growth in winter-spring at the beginning of December 2010. The Globalgap rice cultivation asks some main different points in soil preparation, seeding, weeding management, use of fertilizers, pesticides and drying rice compared with normal rice production.

Table 1: The periods and activities for cropping winter-spring rice (started period on 05-12 Dec 2010) (Source: A Globalgap farmer of the My Thanh cooperative)

Period Activities	Times	Number of days after seeding
Soil preparation		-1
Spraying Herbicide	1st 2nd	-2 3
Seeding		0
Weed control		30 and 45
Fertilizers	1st 2nd 3rd 4th	3 10-12 20-25 30-35
Spraying pesticides		45
Spraying fungicides	1st 2nd 3rd 4th	30 40 50 60
Spraying insecticides	Depend on rice crop yearly	No data
Harvested rice		95-100

3.1.3.1 Soil preparation for sowing rice and weed control

After ending each harvested rice crop, the period of a new crop is begun lately or early depending on season. Soil preparation and sowing period in the My Thanh cooperative are started at the same time and take place in a large area of about 500 hectares, including the partly area of the non-Globalgap rice production in My Thanh Nam commune (Figure 2).

Figure 2: Soil preparation for sowing rice in the My Thanh cooperative in winter-spring (Photo: Le Thanh Qui)

The method of the seeding is row sowing with thin density while the former method was hand sowing. In addition, the same rice variety is sown for all Globalgap farmers while the non-Globalgap production was used different rice varieties such as rice varieties of OM6162, VND20, IR504, AG, OM5451 and OM4900 (Figure 3). The rice varieties are rotational with different occurrence within three crops of year 2011. The rice varieties of VND20, IR504 and AG have the highest occurrence in winter-spring and early summer-autumn, excluding VND20 cultivated in summer-autumn. The last rice varieties are only grown one time per year with different seasonal periods. In addition, the 29 percent of the non-Globalgap farmers' crops cultivated the IR504 rice while the OM6162 and OM4900 rice is only occupied by 7 percent of total crops in year 2011. The non-Globalgap farmers applied these rice varieties according to the farmers' individual experience and available varieties in local area.

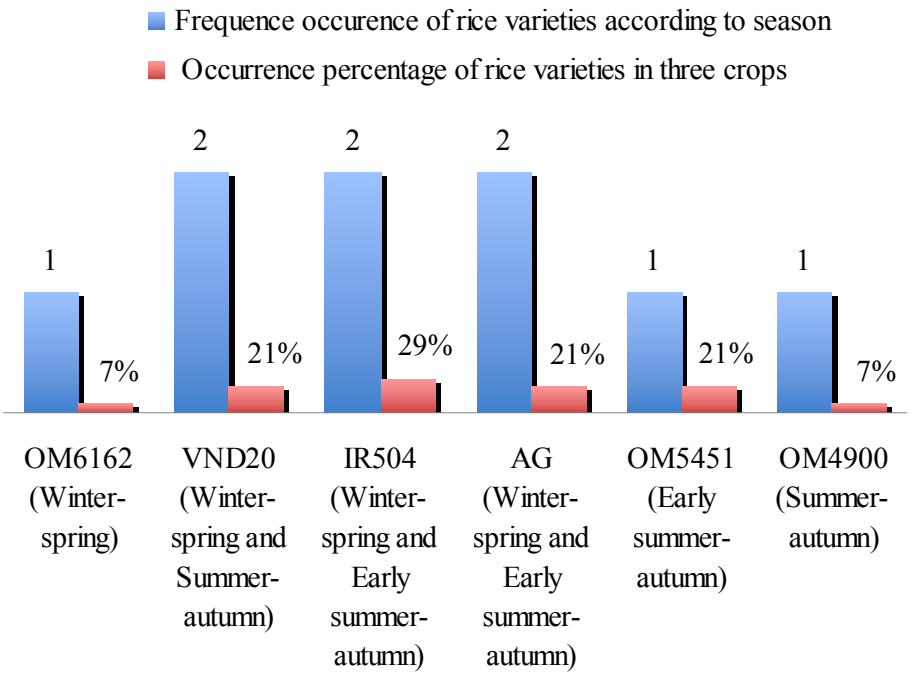

Figure 3: The frequence and the occurrence percentage of the rice varieties in three crops produced in non-Globalgap rice fields in year 2011

Besides, the Globalgap farmers manage weed by spraying herbicides only one or two times per a crop, one time for before sowing and the other for after sowing about one to three days. Then, the Globalgap farmers exclude the weed by hands if the weed continues to grow up at periods of 30 or 45 days after seeding in their rice field.

3.1.3.2. Fertility and fertilizer

The fields of the Globalgap rice are mostly fertilised by synthetic fertilize. The amount and times of applying fertilizer in each Globalgap farmer depend on the situation of rice growth and yearly season. Generally, 100 percent of the farmers use less fertilizer with applying Globalgap standard. The amount of fertilizer is reduced averagely about 5kg per 1000 m^2 from applying the Globalgap rice farming system. The Globalgap farmers often apply approximately 35 kilograms per 1000 m^2 in winter-spring crop (Figure 4). According to the farmers' experience and rural geographic condition, the amount of the applied fertilizer is increased about 5 to 10 kilograms in the two rest crops.

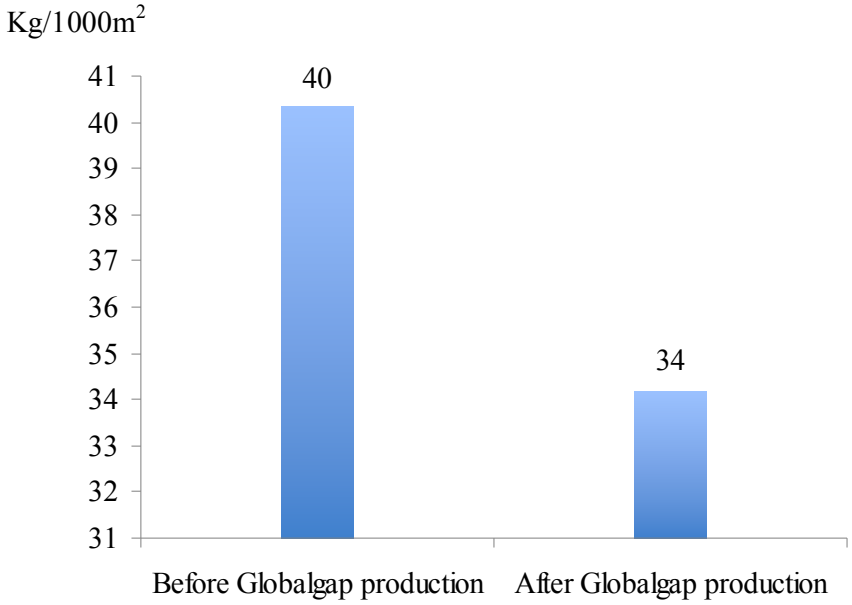

Figure 4: The average amount of fertilizer applied for 1000m^2 before and after participating in the Globalgap rice in winter-spring crop

Besides, about 40 percent of interviewed Globalgap farmers apply organic fertilizers in rice growth while the non-Globalgap production indicated only 11 percent (Figure 5). Their purpose of putting in the organic fertilizer is to improve soil structure and help rice grow better especially in the two last crops because the Globalgap farmers said that natural conditions of the two last crops are not favorable like the first crop-the winter-spring crop.

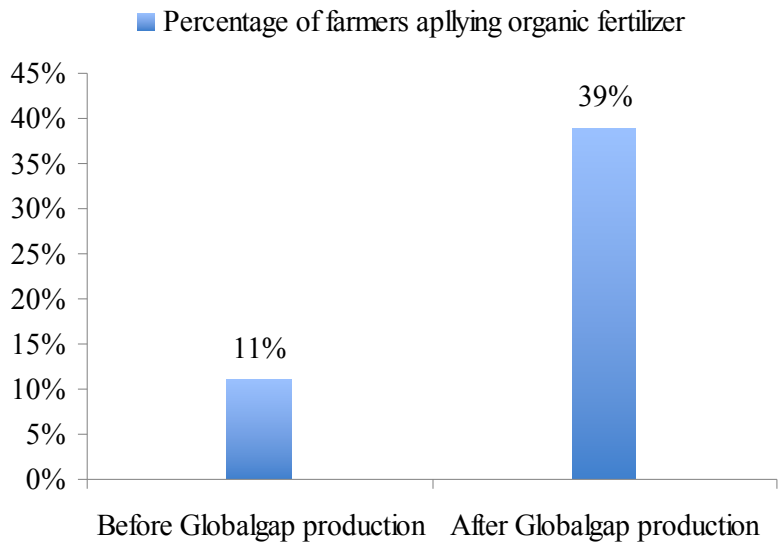

Figure 5: The percentage of Global farmers applying organic fertilizer on their rice (Appendix 7)

3.1.3.3 Situation of pests and diseases

Almost all farmers only own production areas of small-scale approximately one hectare in the My Thanh cooperative. The boundary eliminate of smallholders in rice production creates potential rice production of large-scale areas (figure 6b). It makes possible for rice production to apply good agricultural practice. In contrast, the figure 6a shows that the two areas of rice fields are different from rice height, colour of rice leaves and rice varieties because the farming system of each individual is not similar. The figure 6a is produced by non-Globalgap method whereas the figure 6b is applied production followed Globalgap standard. Therefore, the maintenance of the boundary between two fields in the figure 6a results in maintaining habitats and food for damage pests and insects in following rice crops and causing difficulties to apply mechanization in farming system. However, the figure 6b shows that the two areas of rice fields are similar about characteristics of rice growth because of applying good agricultural practice management.

Figure 6: Difference of the two areas of rice fields by desultory rice farming (a), Similarity of the two areas of rice fields by the Globalgap rice production (b) (Photo: Le Thanh Qui)

By implement of the Globalgap rice production, the producers expressed that using of balanced fertilizer and biological pesticides reduced the pests and pathogens on their rice. In addition, applying row sowing at the same time and using pesticides according to rule of true four criterions (such as spraying right kind, right dosage, right period and right method) also decrease the damage of the pests and pathogens. Besides, integrated pest management is also applied to protect enemies and environment around, which contributes into reduction of the damage. For example, some Globalgap farmers only spray biological pesticides to prevent Brown planthopper (*Nilaparvata lugens)*. The appearance of the Brown planthopper is very fluctuant on rice yearly. Moreover, all Globalgap farmers exclude insects by hand working within the first forty days of rice growth. In addition, using pesticides and insecticides have to follow allowed pesticide list. Therefore, the times of spraying pesticides are reduced about three times within the first 40 days after sowing rice compared with the previous pesticide spraying (Figure 7). As a result, the Globalgap rice production not only uses less pesticides and insecticides but also increases manageable capability of diseases and pests better.

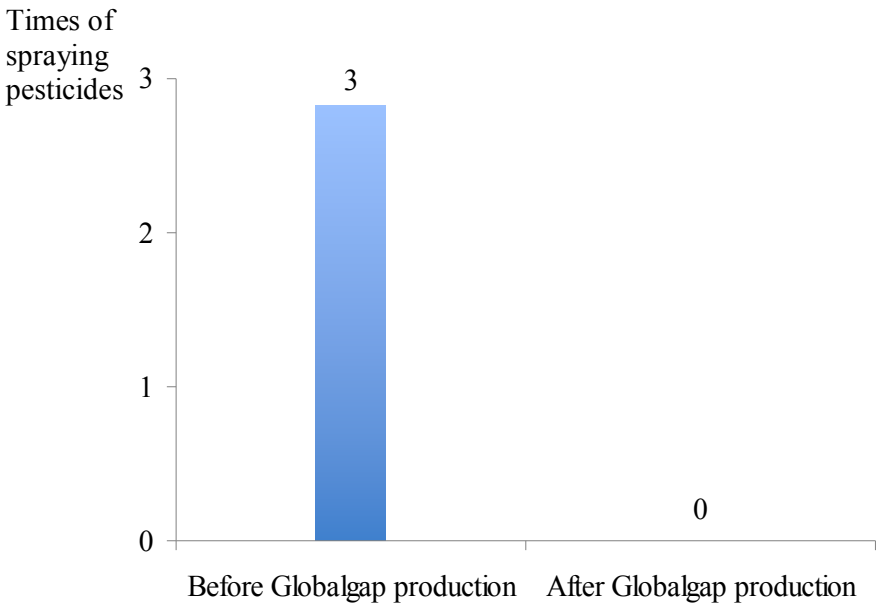

Figure 7: The average times of spraying pesticides within the first 40 days after sowing rice

3.1.3.4. Harvesting and drying rice

After about 90-100 days of rice growth, rice is harvested by conjugate mowing-machines. Rice is carried back home and dry under the sunlight. The Globalgap producers have to use net to encompass area of dried rice in order to prevent domestic animals around their house (Figure 8a) while non-Globalgap farmers dry rice in the sun without any protective condition (Figure 8b)

Figure 8: Encompassment of Globalgap rice by guard-net as drying rice in the sun (a), Drying rice by non-Globalgap rice production (b) (Photo: Truong and Hieu, 2008)

However, the two last crops are often not favoured by heavy rain and lack of the sunlight. In these cases, rice is dried by heaters. After rice is made dried with humidity of the 15 percent, the ADC Company buys all of the Globalgap rice according to the agreement contract between the My Thanh cooperative and the ADC enterprise. Certainly, the guaranteeing contract ensures that the business pays price with higher percentage compared with rice price in market at the same variety of rice. According to variety of rice, the ADC Company pays how much percentage of the premium price. For example, white rice is paid by 20% higher price while the other rice (Cam Cai Lay rice) is paid about 1.6 higher times compared with the similar rice variety in the market. Thanks to support of association of the four stakeholders and applying advanced technologies, the Globalgap rice production in three crops of the My Thanh cooperative gains about 1.398 tons of OM 6162 rice variety in year 2010 (Hai 2010).

3.1.3.5. Preparation seedbed for following rice crops

After harvesting rice, rice straw is burn in winter-spring rice (Figure 9). However, the residue is buried into soil by seasons of heavy rain and coming flood for the two last crops. The producers suppose that the cover of the rice straw in soil increases disintegrated capability rapidly to prepare for next rice crops in time.

Figure 9: The rice straw is spread aboveground for burning to prepare for next crop

3.1.3.6. Support of agricultural organizations for the Globalgap rice cultivation

During the process of the Globalgap rice cultivation, the producers are supported knowledge, advices and agricultural materials from Department of Agriculture and Rural Department of Cai Lay district, ADC business, and other agricultural companies. Department of Agriculture and

Rural Department of Cai Lay district is responsible for advising and overseeing the process of the production according to the Globalgap standard. The ADC Company supports an engineering worker to help and follow the stages of rice growth within area of 50ha. In addition, the ADC Company carries out supply of rice seed for the Globalgap rice production. The agricultural companies of fertilizer and pesticide materials often organise workshops to advertise and guide the producers how to use fertilizers and pesticides rightly. Then, the producers buy fertilizer and pesticides from the companies through retail shops.

Moreover, the southern center of plant protection plays an important role in following, forecasting and advising about situation of pests and insects for the Globalgap rice in particular and a large area of the rice production in My Thanh Nam commune in general. The southern center of plant protection hires a Globalgap farmer who follows and reports the situation of pests and insects in the My Thanh Nam commune periodically. The farmer uses insect monitoring light trap to catch and count mainly a number of brown planthopper (*Nivaparvata lugens*) species and other damaging insects (Figure 10). Then, the farmer makes a report to the southern center of plant protection. The office supplies advices to help the farmers prevent the pest and insect timely.

Figure 10: The insect monitoring light trap to predict damage of *Nivaparvata lugens* species for the Globalgap rice production

3.1.4. Impacts of the Globalgap rice production on changes of practical culture and protection of environment

The Globalgap rice production needs to be build areas of mixing pesticides and treating pesticide packages in each group of the My Thanh cooperative (Figure 11). Before taking the Globalgap rice production, the producers often used to wash sprayers and mix the pesticides around their field. They often used water source in rice field for washing sprayers. Besides, the packings of the pesticides often were put someplace around rice side. They were less interested in poison of pesticide residues in the packings to environment. Thanks to the separate area, the pesticide packages are destroyed on the spot by certain heat source of fire, and mixing pesticides is less influenced to environment around.

Figure 11: The separate area of mixing pesticides and destroying pesticide packages safely

In addition, toilets and medicine chests are built in the Globalgap farmers' houses in order to meet the management system of Globalgap standard followed rice production (Figure 12). The change is meaningful positively in enhance health and sanitation condition of the Globalgap households. In contrast, use of toilets by fishing ponds can cause polluted water. Besides, the Mekong Delta has the complex river system. As a result, it is difficulty to manage water source if there is still presence of toilets by fishing ponds. Therefore, the Globalgap farmers had to abolish the built toilets by fishing ponds when they participated in the Globalgap rice production.

Figure 12: The equipment of the seft-destroying toilet (a) and the medicine chest (b) in Globalgap households

Moreover, the Globalgap farmers that breed pigs are compelled to build biogas cellar (Figure 13). The biogas contains manure and wastewater from the pigs. The decomposition of the manure in condition of fastidious anaerobe alters into biogas. The process reduces environment pollution because the manure cannot directly move in soil, water and air. Besides, the biogas is used for cooking in the families instead the farmers have to spend much cost for buying synthetic gas or cooking by woods.

Figure 13: The building of the biogas cellar for households that breeding pigs in My Thanh Nam commune

As a result of building the infrastructures, one hundred percentage of the interviewed Globalgap farmers recognised that they bring benefits for protecting their health and neighbour's from reducing the contact of pesticides directly and reducing amount of pesticides putting in environment.

3.1.5. Influence of the Globalgap rice production on non-Globalgap producers

The influence of the current Globalgap rice production plays an important role towards widening of Globalgap rice land area in future. Many difficulties in operative system of Globalgap rice production result in reduction of Globalgap participants prospectively.

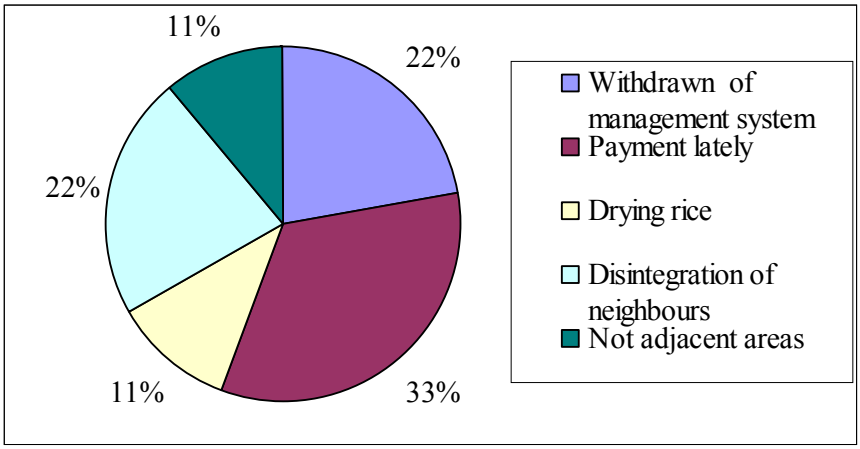

Figure 14: Percentage of reasons causing obstacles for participating in Globalgap rice production

The figure 14 shows the different percentage of obstacles in participation of the non-Globalgap farmers. One of five interviewed non-Globalgap farmers participated in the Globalgap rice in the past. The farmer left the My Thanh cooperative because of withdrawn of management system. The farmer was not invited to participate in meetings of the following Globalgap rice crops. Therefore, they initiatively left the Globalgap rice production. Some other non-Globalgap farmers also meet the similar issue that occupies about 22 percent in withdrawn of management system. However, the reason of the late payment causes the highest percentage with a third of the non-Globalgap rice farmers. Whereas the issues of drying rice with humidity of 15 percent and land areas not located adjacently indicates the same rate of 11 percent. Although most non-Globalgap farmers have never participated in the Globalgap rice production, they meet more objective reasons than subjective factors.

3.2. The current food system of Globalgap rice

3.2.1. The process of rough rice in the My Thanh copperative

After the dried Globalgap rice by humidity of 15 percent, the rice is retained at the households or is transported partly to the storages of the My Thanh cooperative. However, the 40 percent of harvested rice is still preserved at the Globalgap farmers' house from 1-3 months according to rice varieties. For example, the Globalgap white rice is stored at the Globbalgap households with the shorter time of about 1-2 months. After that, the rice is shipped to some husk removed factories within the My Thanh Nam commune when the ADC Company requires how much rice is milled. The ADC Company is also the stakeholder of distributor besides of guarantor role. The rice is removed husk and bran separately. Then, the rice is shaped and milled. According to predilection of consumer market, the rice is milled at different processing steps by multistage mill. The classification of the husked rice is often divided into milled rice, the small and large broken rice, husk and bran. Mainly depending on the rice milling process, rice varieties and process of dried and stored rice, the rice has one or several different fractions. Rice that has 5 percent of broken kernel or less than is called milled rice (white rice). The small broken rice has broken kernel of about 15 percent. The other broken kernel of rice is called the large broken rice. The husk is milled into bran. The bran and the large broken rice are mixed each other to become animal food. The animal food is sold on site of the mill factories. The milled rice and the small broken rice is transport to the packaging company in Can Tho city, only packaged white rice. Generally, the milled rice only occupies about 50 percent of whole rough rice while the small broken rice indicates about 15 percent of whole rough rice. The large broken rice and bran demonstrate about 15 percent of the same figure. The other percentage of parts such as husk, chaff, weed seed and stone that do not belong to milled rice kernel occupies by about 20 percent of the same figure. The result is similar with the report of Vegas (2008). The percentage of broken rice ranges from 12 to 24 percent of total rough rice, which is considered successfully in milled rate because the higher percentage of the broken rice is favoured by consumer market.

3.2.2. The process of packaging and transportation of the Globalgap rice

The Globalgap rice is packaged and stored in Can Tho city after the completed milling process. Each package of the Globalgap rice is just 5 kilograms. After packaged rice of 5 kilograms, the packages are transported to storages in Ho Chi Minh city. Ho Chi Minh city is principal market of the Globalgap rice consumption. Ho Chi Minh city is located in the southern part of Vietnam (Figure 15). Most of Globalgap rice is consumed by customers in Ho Chi Minh city.

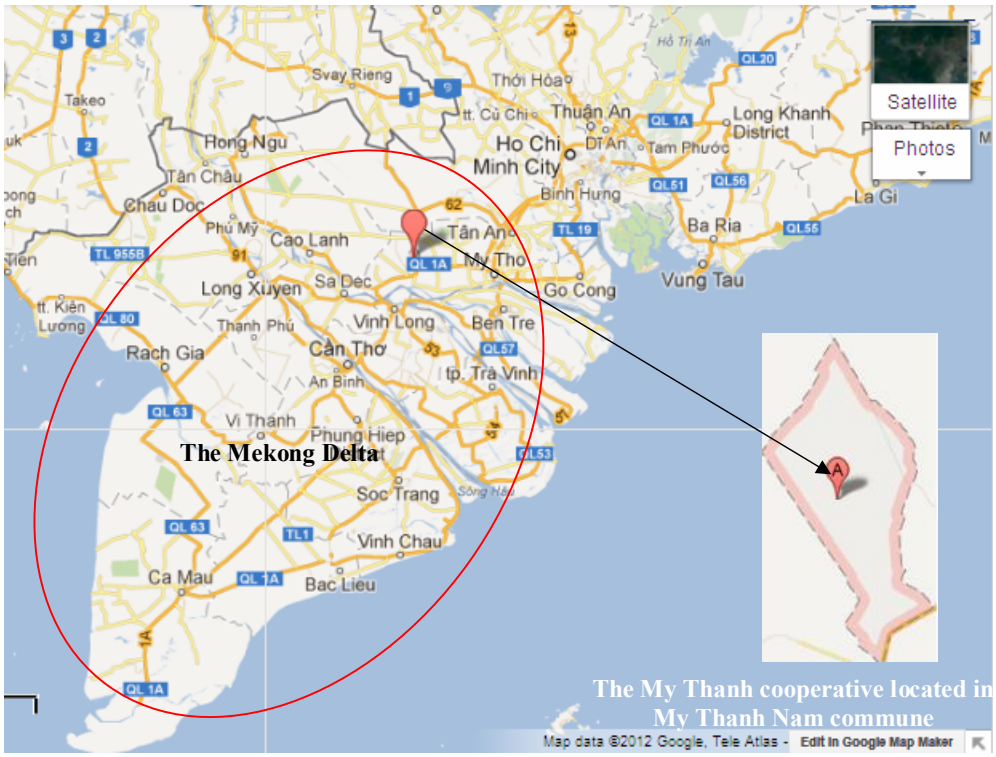

Figure 15: Location of the My Thanh cooperative in My Thanh Nam commune of the Mekong Delta of Vietnam (Source: Google map 2012)

3.2.3. Milled Globalgap rice market in Ho Chi Minh city

The systems of supermarket and retail store are two main distributive channels of the Globalgap rice market in Ho Chi Minh city. Besides, the ADC Company also distributes the Globalgap rice to some enterprises, a restaurant, some individual organization and office staffs in Can Tho city of the ADC Company. The two systems of the supermarkets are Maximark and Citimart. The Maximark system of An Phong Company has two branch supermarkets in Ho Chi Minh city. The other three branches of the Maximark are located in Can Tho, Nha Trang and Cam Ranh city respectively. The Citimart system of Dong Hung Company has about twenty branch

supermarkets that are located all over districts of Ho Chi Minh city. Whereas the largest distributing channel of the Globalgap rice is retail stores. There were about 40 retail stores in the past. Nevertheless, the channel now is reduced at about 20 retail ones. Exploring food system of the Globalgap rice interviewed three retail stores of the Globalgap rice such as Thanh Bach, Long An and Viet Thai shops and the two retail stores of the non-Globalgap rice such as Minh Quan and Thanh Phong ones. In addition, the ADC Company also delivers small retail market of the Globalgap rice to some provinces of the Mekong Delta such as Can Tho, Hau Giang, Tien Giang. The proportion of retail markets occupies about 90 percent of total amount of the produced Globalgap rice in the My Thanh cooperative whereas customers of market systems consume only about 10% at the same figure.

Figure 16: Displaying many kinds of non-Globalgap rice in retail stores in Ho Chi Minh city

These retail stores have age-old experience of doing business on rice. The Globalgap rice business of these retail stores have started just for some months to 3 years. The both Globalgap and non-Globalgap retailers mentioned that almost all of rice in their shops can not afford to trace back the farm origin, excluding only the Globagap rice. The non-Globalgap rice is contained in sacks without packaging because its primary origin is not written on the rice sacks (Figure 16). Thence, the retailers try to look for some places of cultivated rice within the Mekong Delta where they are really secure to buy rice. They do not want buy unreal rice or low quality rice.

In the past, some of them used to buy rice of low quality. Therefore, retailers just buy rice from age-old business relationships. They are really not interested about farming origin of cultivated

rice nevertheless they need to know which countries or which regions rice come from. For example, the retailers often sell rice that comes from the Mekong Delta, Thailand and America. The retailers believes the reason of the territorial or nation original identification because customers in Ho Chi Minh city are very interested in rice quality such as taste, colour, appearance, territorial original and price, especially in customers of high income. Therefore, one of three interviewed retailers often displays cooked rice gaining the Globalgap standard in their store for new customers. Therefore, the customers are able to feel how the delicious the Globalgap rice is. Besides, the customers might believe in the trading prestige of the retailers. Besides of the advantage, the retailers also meet some difficulties in their business of the Globalgap rice. For example, the Globalgap rice is easy to be humid, mouldly and changed colour of rice if it is stored a long time in their retail stores because there is no preservative substance in the Globalgap rice. In addition, source of the Globalgap rice that the ADC Company supplies for the retail stores is not stable and lacks broadcast market. Moreover, the price of the Globalgap rice is fair high compared with other popular rice in market.

3.3. Key issues of the farming system of the Globalgap rice

The current Globalgap rice production is evaluated through strengths, weakness, opportunities and threats analysis (SWOT) (Table 2). The analysis exposes overviews of the current situation of the Globalgap rice production in the My Thanh cooperative. Moreover, the thesis focuses key issues that are helpful for exploring challenges and possible improvements of the Globalgap rice system in future through vision 2020 with producer stakeholders. Besides, the rich picture of the Globalgap rice production system is a tool to support for analysing the current situation. Thanks to use of the rich picture (Figure 17), the external and internal relationships of the complexity system are expressed by SWOT analysis.

Figure 17: Rich picture of the farming system of the My Thanh cooperative in My Thanh Nam commune

The table 2 shows the expression through strengths, weakness, opportunities and threats of the Globalgap rice production in My Thanh cooperative. The strengths and weaknesses are internal factors that are indicated within rice farming system whereas the opportunities and threats are external elements that have influence on reduction or increase rice farming system. The farmers were trained knowledge of rice production with high safety and quality before starting participating in the Globalgap rice production. Besides, cooperation of the Globalgap farmers creates a potential area of rice production by applying rice production followed Globalgap standard. Therefore, harvesting rice is guaranteed by higher price. Furthermore, the rice production with low input expenses results in reduction of environment pollution by applying less chemical fertilizer and pesticides. To gain these achievements, many organizations supported building of primary infrastructure and engineering staffs to help the producers implement the Globalgap rice production. In contrast, there are also many limitations that cause difficulties for process of the Globalgap rice production. The Globalgap rice is cultivated three crops per year. Rice monoculture might reduce natural species appearance. In addition, lack of rice storages and dryers declines rice quality at the period after harvesting. Moreover, lacking cooperation of Globalgap neighbours also results in disintegration of Globalgap rice production in My Thanh cooperative. Besides of these weaknesses, there are also many threats that cause negative influences in the Globalgap rice production. For example, early coming floods cause

rice sowing not in time. In addition, the high price of the Globalgap rice restricts customer diversity. The Globalgap rice is mainly sold in urban areas. Furthermore, big distributors do not want to participate in guarantee of the Globalgap rice. Last but not least, cost of certification and recertification yearly is high for the Globalgap rice production.

Table 2: SWOT analysis of the Globalgap rice production system in the My Thanh cooperative

Strengths	Weaknesses	Opportunities	Threats
- Knowledge and experience of high quality and safety rice production.	- Limited biodiversity by applying rice monoculture with three crop per year	- Enhance protection of natural ecosystem	- Effects of early coming flood season at periods of sowing and harvest
- Rice guaranteed after harvesting	- Lacking diversity of rice varieties in Globalgap farming system	- Support of many organizations to build infrastructure of Globalgap rice production	- High price of Globalgap rice to consumer
- Low input expenses of Globalgap rice production	- Lack of storages after harvesting rice	- Practice ecology knowledge through foreign projects	- Limitation of local Globalgap rice market
- Irrigated water source is sufficient during the year	- Difficulty in drying rice by standard humidity when rain season is coming	- Oversee pests and insects periodically by agricultural departments	- Lack of big distributors for Globalgap rice market in the Mekong Delta
- Cooperation of Globalgap farmers in the My Thanh cooperative	- Difficulty in implement standards of Globalgap rice production versus productive habit of cooperative farmers	- Oversee and advise to help Globalgap farmer look after their rice from agricultural staff of business	- Ask to register recertification of Globalgap rice production yearly and its is high
- Build up civilised and developed life	- No synchronous cooperation of neighborhood farmers in participating Globalgap rice production	- Sources for purpose of education and science	

3.4. The current situation analysis

3.4.1 Lack of species diversity in crop and customers' demand in market

The paddy rice production in My Thanh Nam commune has applied monoculture cultivation for many years. The farmers are familiar with cultivating three rice crops per year. Therefore, the Globalgap rice production in the My Thanh cooperative is also cultivated intensively by three crops per year in permanent wetland condition. On the other hands, the My Thanh cooperative has cultivated rice varieties from the ADC Company. The farmers often grow only one rice variety for three crops per year according to signed contract between the My Thanh cooperative and the ADC Company. In other cases, a new rice variety will be replaced to meet both request of both producers and customers. Moreover, the new rice variety needs to be suitable for natural production conditions in My Thanh Nam commune. As a consequence, the farming of single crop results in reduces of species that result in loss of biodiversity. Moreover, the demand of spraying pesticide increases throughout following crops. Most cultivated rice varieties in the My Thanh cooperative are modern varieties because their yield is higher and period of shorter growth. Their growth period often lasts about from 80-100 days. Therefore, soil has less time to rest or not decompose organic materials in time for next rice crops because of continuous cropping. Besides, the continuous copping of rice can cause reduce life cycle of natural species (Anderson and Gugerty 2010).

On the other hand, the Globalgap rice is consumed by classified market. The Globalgap rice is produced in My Thanh Nam commune of the Mekong Delta; however, customers in Ho Chi Minh city consume most Globalgap rice. Moreover, most customers with high income buy the Globalgap rice because of its high price. As a result, a large number of customers in Ho Chi Minh city with low or average income cannot afford to purchase the Globalgap rice. Furthermore, the customers in the Mekong Delta where the Globalgap rice is produced lack market of the Globalgap rice. The limitation of customer and market might result in narrowness of the Globalgap rice consumption.

3.4.2 Lack of infrastructure

The lack of rice storage house causes not only many difficulties for producers but also reduction of rice quality during milled process. The Globalgap farmers have to usually put rice in their house about one to three month after harvesting rice; however, most of all farmers do not have separate storages. Therefore, condition of storage is not standard enough to preserve rice quality. It is easy for insects such rice-borers and mouse to eat rice. Besides, it also makes possible for

rice to be infected by microorganisms. Moreover, rice quality is diminished by effect of high temperature and humidity. As a consequence, the high loss rate of the milled process results in a lot of the broken rice. A large amount of the broken rice causes lower price of rice. Through interview with a distributor stakeholder, he suggested that the condition of rice storage is also not standard enough to maintain rice quality. Therefore, a mount of rice that contacts much outside natural conditions is reduced its quality such as discolour, much broken kernel in milled process and high humidity.

On the other hand, both the farmers in the My Thanh cooperative and the farmers in My Thanh Nam commune have to carry out sow synchronic within from 7 to 10 days. Besides, the sowing rice is often later about 15 days in winter-spring crop to prevent a pest (*Nivaparvata lugens*). However, the yield might be affected by early coming flooding in the third crop-late summer-autumn. The producers in My Thanh Nam commune only use temporary dams to reduce flooding level (Figure 18).

Figure 18: The temporary dam for control water source in rivers in Globalgap rice production

3.4.3. Economic

3.4.3.1. Lack of local markets

The Globalgap rice market is principally distributed in the supermarkets and retail stores in Ho Chi Minh city. The rest little market of the Globalgap rice is delivered to some provinces of the Mekong Delta. Besides, the ADC Company does not prefer to distribute white rice in the Mekong Delta. The ADC Company wants to sell black rice (Cam Cai Lay rice) for the market of

the Mekong Delta. However, the black rice is a special variety of rice. It contains more protein, more minerals, vitamins and especially high anthocyanin component (no absentee in white rice) compared with white rice. Besides, the black rice might be good for health of old people (Hai 2011, cited in Thao 2011). In contrast, the market of black rice is too narrow because of special characteristics. The Cam Cai Lay rice has characteristics of dark violet colour and sticky. Therefore, the customers are not familiar with the black rice compared with white rice. Moreover, lack of policies supports the local market of the Globalgap rice in the Mekong Delta in order to encourage customers to eat the Globalgap rice. Furthermore, the potential organizations of rice business in the Mekong Deltta have not still do business of the Globalgap rice. As a consequence, the local market of the Globalgap in the Mekong Delta rice cannot meet customers' demand about the high quality rice.

3.4.3.2. Lack of local consumer demand

The ADC Company said that price of the Globalgap rice is fair high with about 1US per kilogram. Therefore, it is not easy for income of most local people in the Mekong Delta to purchase with the price of the Globalgap rice. In addition, the potential market of the ADC Company has only concentrated in Ho Chi Minh city where most of all the Globalgap rice is consumed. As a result, the local consumers might lack information about the Globalgap rice. The lack of the information can reduce demand as well as competition of other quality rice in the Mekong Delta. Another indirectly reason of lacking local customer demand is that inputs of Globalgap rice production system are high by certification and annual recertification expense of Globalgap rice production. Besides, the process of the Globalgap rice spends much cost of inputs for transport and rice packing. As a consequence, the local people who work with low earnings cannot purchase the Globalgap rice.

3.4.3.3. Mismatch of production and market

Though the meetings with rice retailers, the supply and demand is not proportionate. There are many reasons that result in mismatch between production and market. In the first period, the My Thanh cooperative met difficulties in outlet market because the Globalgap rice was new to customers and was the first presence in domestic market. However, the white rice of Globalgap standard is quickly to break into customers' belief after producing the Globalgap rice about two years from year 2009 to 2010. Secondly, the ADC Company changed to cultivate Cam Cai Lay rice in early summer-winter crop in 2011. The area of Cam Cai Lay rice occupied by 39 ha of total about 100 ha of the Globalgap rice. The cultivation and explanation of Cam Cai Lay rice in

My Thanh cooperative caused lack of customers' expectation in white rice of the Globalgap standard. Once more, the out market of Cam Cai Lay rice has to face lack of customers' interest while the production of white rice of the Globalgap standard is not enough to supply for customers. Therefore, many retail shops were not enough white rice of the Globalgap standard to provide customers within over three months. In sum, the production of Cam Cai Lay rice occupied part area of white rice, which resulted in mismatch in production and market of the Globalgap rice.

3.4.3.4. Interaction between farmers' profit and regulations of Globalgap production

The rice production of the Globalgap standard requires many strict regulations. Besides, the expense of granting Globalgap recertification yearly and first investment for building infrastructure, training farmers, granting Globalgap certification and etc are very costly. Therefore, the process of the certification was sometimes not in time to guarantee good rice price for the Globalgap farmers. As a consequence, the rice price of Globalgap non-certification was fallen lowlier compared with the Globalgap standard granted rice. The lower payment made the farmers feel insecure their Globalgap rice production although the ADC company still guarantee the Globalgap certification not granted rice. In these cases, some farmers revealed that their profit is not as high as previous rice production. The farmers can cultivate any modern rice varieties with very high yield. Moreover, they do not need to follow strictly regulations of Globalgap standard. For example, rice is sold for traders without drying. The factor is very convenient for producers in rainy season.

3.5. Key issues of the food system of the Globalgap rice

The current food system of the Globalgap rice is evaluated through strengths, weakness, opportunities and threats analysis (SWOT) (Table 3). The analysis exposes overviews of the current situation of the Globalgap milled rice. Moreover, the thesis focuses key issues that are helpful for exploring challenges of the Globalgap rice food system in future. Besides, the rich picture of the Globalgap rice food system is a tool to support for analysing the current situation. Thanks to use of the rich picture (Figure 19), the external and internal relationships of the complexity food system are expressed by SWOT analysis.

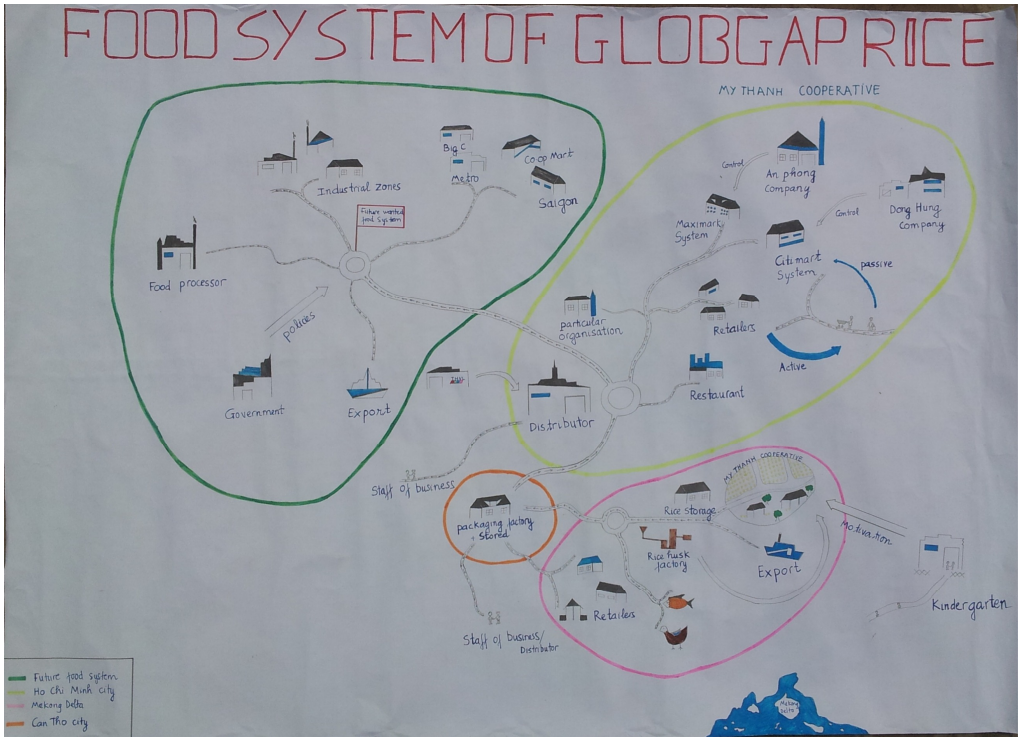

Figure 19: Rich picture of the food system of the Globalgap rice

The table 3 shows the expression through strengths, weakness, opportunities and threats. The strengths and weaknesses are internal factors that are indicated within rice food system whereas the opportunities and threats are external elements that have influence on reduction or increase food consumption. There are some cooperatives of the Globalgap rice production in the Mekong Delta; however, the My Thanh cooperative has largest production area and is able to maintain the potential market at the interviewed period. Besides, interviewed retailers said that customers accept to purchase the Globalgap rice although its price is high compared with other quality rice. The customers believe trademark of the Globalgap rice that is produced in the My Thanh cooperative. The Globalgap retailers also want to continue to sell the Globalgap rice in future. However, they said that the Globalgap rice needs to advertise more popularly on many means of communications because fewer customers know about the Globalgap rice. According to interview with distributor, supporting policies prospectively of food safety and hygiene organization in Ho Chi Minh city will improve market of the Globalgap rice. In addition, the changes in distribution policy of the Globalgap rice can increase number of the Globalgap customers as well as widen area of the Globalgap rice. The Globalgap rice will be sold by many different markets with various weight of each package instead of only a package of 5 kilograms in current period. In contrast, weaknesses and threats of the Globalgap rice might reduce trademark of the Globalgap rice. For example, price of the Globalgap rice is high. Therefore,

most only customers with high income can afford to purchase the Globalgap rice. The price of the Globalgap rice is increased because high expenses of milled process, packaging and transport. Besides, predilection of customers about the rice characteristics is too diverse. Moreover, the Globalgap rice can not be preserved as long as other popular rice on markets because there is no use of preservative substance in the Globalgap rice. Furthermore, supply source of the Globalgap rice is not stable because of lack of the Globalgap rice in retail stores in a long time. The change of rice varieties between white rice and black rice cultivation causes lack of the Globalgap white rice on market because consumption of the Globalgap black rice is much less than the Globalgap white rice.

Table 3: SWOT analysis of the Globalgap rice food system

Strengths	Weaknesses	Opportunities	Threats
- The largest domestic market of supplying the Globalgap rice	- Most customers unknown about the Globalgap rice	- Perspective supporting policies of food safety and hygiene in Ho Chi Minh city	- Diversity predilection of customers about the rice characteristics
- Black rice with more nutrient contents	- Market segmentation of the Globalgap rice by its high price	- Changes in distribution policy of the Globalgap rice to customers in future	- The supply source is unstable
- Enthusiasm support of retailers in the Globalgap rice business	- No communication between Globalgap rice producers and big distributors	- A small exporting market of the Globalgap rice	- Supply and demand is mismatched
- Customers with high income and parents interested in quality, safety and origin of rice for health of themselves and their children	- The Globalgap rice unpreserved in long time because of no use of preservative substance	- Advertising the Globalgap rice through the scholarship supporting programe	The limited number of customers with high income
	- High expenses of milled process, packaging and transport	- The purchase of office staffs of the ADC company about the the small broken Globalgap rice	- Restraining update of the Globalgap rice price in retail stores to keep familiar customers
	- High competition with other quality rice		- Advertising is not still enough strong
	- None of many policies to support outlet markets for retailers		- Local consumer and potential market of the Globalgap rice is small

3.5.1. The response of markets toward the food system of Globalgap rice

Through interviewing stakeholders of the Globalgap rice food system, the Globalgap rice production has not really meet customers' diverse demand because the association of the four stakeholders only focuses force of production standard while market activities and support have not still exploited carefully. Besides, the Globalgap rice production has not been applie popularly in the Mekong Delta. The retailers believed that most customers do not know about the concept "What Globalgap standard is" because the Globagap rice is sold on markets by both two trademarks of "Tu Quy" (white rice) (figure 20a) and "Tu Quy Phuoc Loc Tho" (black rice or Cam Cai Lay rice) (figure 20b).

a) b)

Figure 20: The packing of ¨Tu Quy¨ Globalgap rice (a), the "Tu Quy Phuoc Loc Tho" Globalgap rice (b)

Almost of all the customers bought the Globalgap rice passively. They had not had intention to buy the Globalgap rice before they visited rice stores. Besides, the retailers said that their customers are only interested in quality characteristics and origin of rice through the retailers' speaks. The retailers have sold rice for many years. Therefore, it is not difficulty to see the retailers if there is any problem of rice. However, it is too difficulties for customers or retailers to know farm origin of the rice where the rice is cultivated. Therefore, the customers also do not really want to find about origin of rice throughout a long time. On the other hand, the retailers assumed that most customers agree to buy the Globalgap rice because the customers believe the retailers' prestige. Therefore, if the retailers try to convince and advertise more about the

Globalgap rice, the customers would agree to purchase the Globalgap rice although its price is fair high compared with other popular rice in market. However, customers often have diversity predilection of rice characteristics such as taste, shape, texture, flavor and glutinousness. Therefore the customers' demand is different groups of rice characteristics. For example, some customers are interested in sweet of rice. Other customers like to choose texture of rice such as softness, hardness, glutinousness or chewiness. The rest group favours shape or flavor of rice such as long grain rice or short grain rice or its milk flavor. In addition, the customers can choose rice that contains mix characteristics such as not only milk flavor and sweet but also long grain rice and softness. The complex characteristics cause high competition of the Globalgap rice compared with other quality rice because the Globalgap rice only has three varieties of OM3536, OM6162 and Cam Cai Lay rice. Moreover, the all Globalgap rice varieties were not presented at the same period. The Globalgap farmers cultivated rice variety of OM3536 and OM6162 in year 2009 and 2010 respectively. According to policy of Globalgap rice in ADC Company, the OM3536 and OM6162 have main characteristics of softness, slight flavor and white rice. Like this, it is difficulty for the Globalgap rice to meet diverse demand of customers. The ADC Company believed that the food safety of the Globalgap rice as well as quality characteristics of softness, slight flavor and white rice are prerequisite factors to compete in market. The safety characteristic is indicated by Globalgap standard fallowed rice production. Perhaps, the ADC Company focuses mainly on technology elements to guarantee safety factor of the Globagap rice while the quality characteristics are less interested. In contrast, the retailer revealed that most customers in Ho Chi Minh city prefer quality characteristics to safety factor. Perhaps, the quality elements of rice are attracted much more by the customers than safe characteristic because the customers might not believe clear origin of rice. Therefore, some retailers show ready cooked rice for choosy customers to try to eat when they sell new rice varieties. By this way, it is easy to convince the customers by taste and texture more than hidden safety characteristic. Whereas the retailers wish that the producers need to combine both safe factor of Globalgap standard and customers' diverse predilection.

3.5.2. Processing and production expenditure of Globalgap rice against market potential

The ADC Company organises that the Globalgap rice needs being packaged before supplying to customers. The packaging ensures preservation of the Globalgap rice quality. Therefore, each package of 5 kilograms contains the Globalgap rice. However, the expense of the each packing is costly about 0.3 US dollars. Besides, the cost of transportation for the process of milled rice has

many intermediate steps. Firstly, the Globalgap rice is harvested in the My Thanh cooperative of Cai Lay district. Then the rice is milled at some rice-milled factories within Tien Giang province. After that, the rice is transported to Can Tho city for packaging and storing. It is far about 80 kilometers from the My Thanh cooperative. Finally, it takes about 250 kilometers to transport to large market of Ho Chi Minh city. The transportation increases price of the Globalgap rice towards customers. Moreover, applying Globalgap standard produces the rice in the My Thanh cooperative. Therefore, the annual recertification of the My Thanh cooperative is paid by high cost of about 1000 US dollars. As a consequence, the price of the Globalgap rice is fair high in market. Its price is indicated about 1 US dollar per 1 kg throughout three-year period. It is the main reason that the ADC Company decides to sell mostly the Globalgap rice in segmented markets of customers' high income. Hence, the current market of the Globalgap rice is concentrated in Ho Chi Minh city while the other potential markets have not still developed. Especially, a large number of customers have lower earnings in Ho Chi Minh city in particular and in the Mekong Delta in general. According to report of CSA (Center for Asian studies), the population ratio of rural area is occupied by about 80 percent of total population in the Mekong Delta (Nam et al. 2000). Therefore, rural markets might be potential markets that consume a large amount of the Globalgap rice in future.

3.5.3. Lack of potential distributors for large markets

According to Hai's ideas, a stakeholder of both scientist and local government, the enlargement of potential markets depend mainly on government organizations (such as Vietnam food association) and bigger enterprises although the ADC Company plays both roles of guarantor and distributor. Vietnam food association is a social organization of enterprises that operates in the fields of production, process and trade of food. Its precursor name is Vietnam food import and export association (VFA 2012). Therefore, the organization has potential enough to not only widen the domestic market of the Globalgap rice but also progress exporting the Globalgap rice in the world. However, the big investor as well as other businesses has not still really started the guarantee of the Globalgap rice.

3.5.4. Local production versus local consumers

The Globalgap rice is produced at the My Thanh cooperative where it is fair far about 100 kilometers towards Ho Chi Minh city. The customers of the big city consume most of the Globalgap rice. In contrast, the local people who are living in the rural regions of the cultivated Globalgap rice cannot reach the Globalgap rice, excluding individuals who directly participating

into the Globalgap rice production. Besides, there is not still any policy of government stakeholder to support customers as well as outlet of the Globalgap rice in order to encourage the customers' demand in using the Globalgap rice. Whereas, the Globalgap rice market is not still as popular as markets of other rice varieties such as Nang Thom Cho Dao, Tai Nguyen and Huong Lai. Besides, there are also some varieties that have origin from IRRI, Thailand and Taiwan cultivated in the Mekong Delta. In market, most of the rice varieties are also sold without packing. Therefore, the quality of the rice varieties is also different in the retail stores. The quality different of the same variety results the various price of rice that might meet customers of the different earnings. In contrast, the Globalgap rice only adapt to most customers of high income.

4. The future wanted situation of production system of the Globalgap rice

The workshop was carried out after completing the interview steps. The purpose of the workshop was not only to review the main issues together but also to develop ideal about visioning 2020. From different thinking of the Globalgap farmers, the visioning 2020 was contributed principally to improve the farming system of the Globalgap rice in My Thanh cooperative. The workshop happened ebulliently within over two hours. Each group plays roles of government, scientist, business, farmers and customers respectively. Thanks to suggested questions (Appendix 8), the participants discuss together and present their ideas in font of the workshop (Figure 21). The discussion focused on improvement of infrastructure, manageable system, rice varieties, farming system, process of milled rice, integrating ecology technology and sustainable development. The detail issues are listed below:

- Increase of infrastructure for the Globalgap rice production
- Alternation of crop structure and characteristics of rice varieties
- Increasing the association of the four stakeholders in the Globalgap rice production

Figure 21: The workshop of visioning year 2020 about rice production in the My Thanh cooperative

4.1. Increase of infrastructure for the Globalgap rice production

Chairman board of My Thanh cooperative expects to have a new working place because the old head office is downgraded (Figure 22). Organise meetings, documents and property of the My Thanh cooperative such as computer, fax machine and printing machine is temporarily stored by a Globalgap farmer's house. As a result, the new head office can help the chairman board manage the system of the Globalgap rice production better in future.

Figure 22: Head office of the My Thanh cooperative (Photo: Le Thanh Qui)

On the other hand, the farmers want the rice quality to be maintained to customers' hand after the process of rice harvest is completed. They think that the infrastructure of process of rice dryness, storage, milling and packaging plays important roles in preserve the rice quality. There, the trademark of the Globalgap rice is prestigious through a long time. It is easy for the Globalgap rice to occupy potential outlet markets in future.

4.2. Alternation of crop structure and characteristics of rice varieties

The Globalgap farmers want to change number of rice crops from three crops into two per years. The rice of crop one and three will continue being cultivated. The second crop is replaced by vegetable or left fallow without cropping. The rotation at the second or third crop of rice with mung bean or soil bean could increase soil fertility, especially fixing nitrogen in soil (Soong 2006). Moreover, the farmers expect that fallow soil in the second crop can reduce exhausted soil and is able to good for natural environment by not apply synthetic fertilizer at this period. Besides, fallow soil has more time to decompose the organic residues in soil before beginning the third crop of rice. Certainly, the fallow land brings benefits such as rebalancing soil nutrients, increasing soil organisms and breaking cycles of pests and diseases (Hamer 2008). In addition, the producers want to have more free time for traveling or relax instead of cultivating rice during the year-round period.

On the order hand, the farmers also expect scientists to create special rice varieties with higher yield because the characteristic of the current special variety is long-day and low yield, but its quality is better than short-day rice varieties with higher yield. Besides, the farmers suppose that

changing crop structure into two crops per year helps farmers be able to cultivate the rice varieties of long-day characteristic with higher yield.

Moreover, the participants in the workshop supposed that rice varieties need being organised and managed better. There are many rice varieties in the Mekong Delta; however, the rice varieties mostly are not typical and special compared with rice varieties in Thailand. They think that quality rice varieties are more necessary than diversity of rice varieties. Especially, some rice varieties can adapt global climate change such as salinity infiltration and high temperature. According to the World Bank, Vietnam is listed one of five countries that will be worst influenced by global climate change. The prediction mentioned that inundation and salinity intrusion might cause loss of 590.000 ha rice in the Mekong Delta by 2050, occupying about 13 percent of current rice area (Dyoulgerov 2011).

Furthermore, the participants in role of customer stakeholders hope that they can really eat safe food by not using or reducing minimally pesticide spraying on rice. They suggest the organizations of government and scientists should continue to support producers applying ecological technology in rice production. The farmers recognized that growing the five flower varieties such as Sesame, Okra, Cosmos, Creeping Daisy and Aster Daisy not only attracts many enemies to protect rice but also increases farmers' profit in My Thanh Nam commune in general and in the My Thanh cooperative in particular (Figure 23).

Figure 23: Demonstration of growing flower varieties to attract enemies on the side of rice field (Photo: Le Thanh Qui)

The result of demonstration shows that the number of enemy species such as mirid egg predator and egg parasitoid (*Anagrus* spp), *Cytorbinus* and *Lycosa psseudoannulata* is higher than in control rice fields. The enemies kill brown planthopper that damages strongly on the rice growth. Besides, the growing of the flower varieties makes environment friendlier because the times of spraying pesticides and insecticides is reduced compared with not growing the flowers on the side of rice fields (Son 2012). The demonstration of growing the flowers in the side of the rice fields is impressive deeply in the farmers' rice cultivating experience in the My Thanh cooperative.

4.3. Increasing the association of the four stakeholders in the Globalgap rice production

About the farmers' aspect, they expect to continue maintaining the Globalgap rice production until year 2020. They said that the rice production of Globalgap standard not only improves the farmers' life in My Thanh Nam commune but also supply quality and safe rice to customers. Besides of the benefits, the farmers also want to improve the association of the four stakeholders. For example, the My Thanh cooperative needs to make a report and evaluated production activities after each harvesting crop. The evaluation shows achievements as well as defects in the current Globalgap rice production. As a result, the producers can adjust suitably and improve better production system in time. Besides, the stakeholder of businessmen and scientists should create rice varieties that not only meet domestic markets but also export the Globalgap rice to fastidious foreign markets. In addition, the business stakeholder also improves the process of payment quickly for the producers just after each harvesting crop. Because of instability of outlet market, the ADC guarantor often carries the process of payment for the Globalgap farmers slowly. Therefore, the factor of recovering the farmers' fund will play a main role in economic viability of the farmers. After harvesting rice, the farmers have to pay for expenses of agricultural materials such as fertilizer, pesticide and rice seed in order to invest for next crops.

5. Discussion

Impacts of Globalgap rice production on agricultural practice

Through study case of the Globalgap rice production in the My Thanh cooperative, the exploration shows that the Globalgap rice production has positive impacts on changes of agricultural practice. The change to Globalgap rice indicated factors such as communication of small farmers together in rice production, applying advanced technologies and good practice management in rice farming system, protection of natural environment, and improvement of work conditions.

Infact, Global good practice management helps farmers improve their production such as rice quality and its homogeneous characteristics in order to meet only expected regulations of customers in domestic markets but also global markets (TNAU 2008). Moreover, the control of rice production by good agricultural practice contributes health protection of the producers (Graffham et al. 2007). In contrast, the farmers cultivated rice by his or her individual methods before taking part in Globalgap rice production. Cultivation technologies that are applied in normal rice farming system are not analogous in soil preparation, varieties of rice seed, sowing period, times and amount of pesticide spraying and fertilizer usage, harvesting period. Certainly, price of rice is also very different.

In sum, the Globalgap rice production enhances awareness of the farmers in rice cultivation. The producers supposed that preparation of seedbed in the Globalgap rice production is strictly careful instead of they only carried out it perfunctorily before. The careless of soil preparation causes many threats in rice cultivation such as pests and diseases, weeds and fallen rice. If seedbed is not razed to the ground, disease and fallen rice are occupied in sunken land areas with much water. The sunken land areas contain high concentration of nitrogen compared with shallow areas when farmers supply fertilizer for rice growth. The high amount of nitrogen mostly causes sheath blight and kernel smut on rice (Slaton cited in University of Arkansas 2006). Besides, the high nitrogen also results in fallen rice (Naturland .e.V. 2002). By the Globalgap rice production, the farmers have to prepare seedbed strictly and supply balanced fertilizer to guarantee optimal growth of rice and no nitrate residue in the harvest period.

Moreover, varieties of rice seed in the Globalgap production have clear origin that farmers feel secure to cultivate in stead of they had to find rice seed with wanted yield from their neighbours around or rice seed produced from other regions in previous rice production. However, the quality of the rice seed was depended on previous rice crops. Therefore, they revealed that they

were uncomfortable when their rice field is cultivated the unclear varieties of rice seed. In contrast, the ADC Company is the main supplier of rice seed such as OM3536, OM6162 and black rice for the Globalgap farmers. The rice seed is guaranteed its quality with adequate information such as ability of pathogen resistance, thousand seed weight, growth time, rice height and etc. Besides, applying the synchronizing period of sowing results in reduction of habitat maintain of pests and its hosts in a large-scale (Skaf 1996). Whereas the non-Globalgap rice is sown at different periods and used various rice varieties (Figure 3). In addition, the rice vaieties has different growth characteristics of life cycle, height, yield and rice quality (PM 2012). Mainly, the non-Globalgap farmers manage individually rice sowing to ensure the same period of rice harvest in region. Is is difficult to apply mechanization in the harvesting process if the time of reaped rice is unsystematic. In order to ensure the same period of harvesting rice, the periods of sowing rice has to be different because of the different rice varieties. The different sowing periods in region causes difficulty of preventing *Nivaparvata lugens* (Bhandari et al 2009). In contrast, The sowing rice of the My Thanh cooperative is carried out synchronically and on a large area of about 500 hectares in My Thanh Nam commune although area of the Globalgap rice production occupies just about 100 hectares. The synchronizing period of sowing helps the Globalgap farmers sowing timely. The My Thanh cooperative often sows rice later about 15 days in winter-spring crop to prevent a pest (*Nivaparvata lugens*). Timely sowing helps crops avoid damage of pests in young old by delay of sowing period (HDRA 1998). Furthermore, the amount of fertilizer is used less than from 5-10 kilograms compared with previous rice farming thanks to reduce sowing density on the rice field and use balanced fertilizer. It makes possible to reduce occurrence of pests and diseases better in the Globalgap production. The leafy development of rice canopy and unbalanced fertilizer of nitrogen makes rice more susceptible to pest and insect infestation (Mutert and Fairhurst, 2002). Therefore, the applying Globalgap production reduces times and amount of spraying pesticides.

Besides, the choice of sprayed pesticides has to follow the allowed pesticide list. In contrast, the non-Globalgap and previous rice production is not really interested in poisonous impact of pesticides with health and environment. On the other hand, the Globalgap producers only apply pesticides when the spray is really necessary. In fact, the spraying pesticide is often applied when the rice growth is about 40 days old onwards after seeding. The Globalgap producers usually visit their rice field to follow rice growth. They can observe and recognise occurrence characteristics of some pests and diseases on rice. As a result, they applies pesticide on rice actively according to rule of true four criterions. Moreover, applying ecological technology of growing flowers on the side of rice fields is really impressive on the farmers' cultivating

experience in the My Thanh cooperative in particular and My Thanh Nam commune generally. The ecological technology brings benefits in protecting rice growth from natural factors such as building habitats and food for enemies thanks to presence of the plants such as Sesame, Okra, Cosmos, Creeping Daisy and Aster Daisy. The enemies such as mirid egg predator and egg parasitoid, *Cytorbinus* and *Lycosa psseudoannulata* reduce the abundance occurence of pests such as brown planthopper and other damage species (Son 2012).

Another important alteration of the Globalgap rice production is that process of drying rice is managed strictly after harvested rice. The Globalgap rice is encompassed by guard-net and put above cement-bed to avoid entry of domestic animals and outside objects. Besides, the Globalgap rice is dried by humidity of 15 percent. The quality of milled rice is affected much by condition of rice storage such as temperature, moisture, germination, pest and fungus (Trigo-Stockli and Pedersen, 1994; Vegas, 2008). For example, if rice contains moisture content of 14% at the storage period, the storage temperature remains at stable state within 30 days. However, if rice hold moisture content of 16% or over at the same figure, the temperature in the room storage increases highly throughout time. Besides, the time of storage is also shortened (Trigo-Stockli and Pedersen, 1994). Moreover, the high temperature makes possible for fungus to destroy rough rice. As a result, the damage of fungus decreases the percentage of milled rice and high ratio of discoloured kernels. On the other hand, insect appearance makes loss of rice odour (Vegas, 2008). These practical changes are not applied in non-Globalgap rice production. The non-Globalgap farmers often make dried rice on net or plastic canvas sheet. There is no separate cement-bed for drying rice. The humidity of dried rice that is considered based on the farmers' experience is not measured. Therefore, it makes possible for outside organism to infest rice. In other words, rice quality can be degraded by outside conditions.

Additionally, the Globalgap rice production also impacts on both subjective and objective reasons of the non-Globalgap producers. The interviewed non-Globalgap farmers said that they really want to take the Globalgap rice production because the Globalgap rice is guaranteed and sold with a premium price. However, there are three main reasons of both objective and subjective that they do not produce rice with the Globalgap standard. Firstly, Globalgap rice production in the My Thanh cooperative request adjacently located rice production land areas. The rice production land of the farmers is small-scale and unsystematic in My Thanh Nam commune in individual and in the MeKong Delta in generally while the ADC Company requires the Globalgap rice production on large area to ensure market demand. Therefore, the management system of Globalgap rice production meets many difficulties by implement of IFA

GR and IFA CPCC and purchase harvested rice of the ADC Company if the farmers cultivated Globalgap rice without communication together. Besides, to ensure regulation of separateness in Globalgap standard between areas of Globalgap and non-globalgap rice production, the My Thanh cooperative connect the farmers who own rice land adjacently in order to form groups of the Globalgap rice production. It makes possible for the My Thanh cooperative manage the production system of the Globalgap rice better. The manageable system of the My Thanh cooperative is similar with the operation system of Globalgap production in Kenya and Tanzania. Small-scale producers in Kenya are collected into groups that are called Self Help Group. The Self Help Group represents for group membership to register and implement the Globalgap production. It makes possible for producing a large amount of product and managing the system of the Globalgap production easily compared with the management of the Globalgap production on individual farms (Graffham et al. 2007). Besides, the small-scale farmers share resources of infrastructures, increase economic efficiencies through cooperative production and market, decrease transaction expenses and so on in Tanzania (Musgobozi 2010). In Therefore, the cooperation of the smallholders plays an extremely important role in form areas of the Globalgap rice production in the My Thanh cooperative.

Secondly, the subjective points are practice culture. The Globalgap rice production requires producers to follow many strict regulations compared with previous rice production. The non-Globalgap producers said that they are not uncomfortable in implement of the rules. In addition, the rice yield of Globalgap production sometimes is lower than normal rice production because they can cultivate certain rice variety with wanted higher yield. Besides, they can sell directly rice for traders without drying rice by humidity of 15 percent. Moreover, incommunicativeness of non-Globalgap neighbours decreases establishment of rice production groups followed by Globalgap standard. The two figures of the drying rice and the incommunicativeness of non-Globalgap neighbours indicate the same smallest rate of 11 percent.

Besides, the late payment of the enterprise makes mainly the non-Globalgap producer become discouraged in participating in the Globalgap rice production. The non-Globalgap farmers hope the enterprise should purchase harvested rice timely. Whereas two groups of withdrawn of management system and disintegration of non-Globalgap neighbours occupy not less important part of 22 percent. They want to the chairman board of the My Thanh cooperative should pay attention more in their management to wishes of the non-Globalgap producers. These cases did not happen in Kenya. However, two similar cases that also reduced potential of the Globalgap

production in Kenya are that poor payment and withdrawn of trainers also occupied about 11 and 9 percent respectively (Graffham et al. 2007).

Influence of Globalgap rice on customers' culture

The Globalgap rice is consumed mainly in Ho Chi Minh city where it does not belong to the Mekong Delta. The Globalgap rice (white rice or "Tu Quy" rice) is mainly supplied for a small unit of customers with high income because its price is fair high compared with other popular rice in market. However, the supply source of the Globalgap rice is deficient about over three months since the Globalgap rice ("Cam Cai Lay" rice or "Tu Quy Phuoc Loc Tho" rice) was continuously cultivated in early summer-winter crop 2011 until winter-spring crop 2012. The interruption of farming the of the Globalgap white rice in My Thanh cooperative caused its deficiency in the Globalgap rice market of Ho Chi Minh city. At the interviewing period, Globalgap white rice reserve of the ADC Company was not enough to maintain business of the Globalgap rice in the retailers. Whereas the land area of the Globalgap rice cultivation in the My Thanh cooperative only occupies about 100 hectares, a small-scale area compared with approximately 4 millions hectares of planted rice area in the Mekong Delta in year 2010 (GSO 2012b). However, the consumption of the Globalgap rice indicates that the demand of customers about quality and safe rice is very high. Moreover, the Globalgap rice could win customers' belief in a short time. The change points out customers are ready to change their habit of rice consumption just as the market can really meet the quality rice.

On the other hand, the current production of the Globalgap rice does not meet rural community in My Thanh Nam commune in particular and in the Mekong Delta in general. According to concept of sustainable development in economic issues (Sustainable Table 2012), the sustainable development should support local economies through creating job opportunities and consuming locally made products. Whereas flow of the Globalgap rice consumption is indicated largely in Ho Chi Minh city by the ADC Company. Hence, local consumers of the Mekong Delta could not approach the Globalgap rice. In contrast, the case study in Tanzania shows that rural consumers can use GAP products easily through such as informal business such as gate of farm village market and other open-air retail markets. In these cases, direct trading is happened between producers and customers. Besides, the formal local retail markets also sell GAP products from wholesalers to local customers. The formal markets are known as retail stores and small supermarkets in village (Musgobozi 2010).

In addition, an interview with kindergarten shows that demand of children is very high both of quality and safety food. However, the manager of kindergarten believed that they could guarantee about quality because the food ration of children is mixed by many kinds of food such as vegetable, meat, eggs, fruit, milk and rice. Nevertheless, the reliable safety of food cannot afford to guarantee absolutely. Therefore, the quality and safety of food is importantly considered in ration of children because their parents are very strictly in children' food. The manager wishes to find about the Globalgap rice because it is the first time that she hears about the Globalgap rice. In addition, she said that price of the Globalgap rice is not too high. The price is still accepted compared with the currently used rice price in the Kim Dong kindergarten. Furthermore, she also hopes the producers should meet diverse characteristics of rice varieties because the rations of children are very different from adults. Therefore, the characteristic of rice are required all level of flavour, sticky, soft and sweet. Besides, expanding ratio of cooked rice should be low in order to mix with other components of children's good rations. On the other hand, the exploration of Globalgap rice food system could not contact stakeholders in canteens of schools, hospitals and food shops for children. However, the ADC Company said that they did not sell the Globalgap rice to these stakeholders. Perhaps, the stakeholders lack information of the Globalgap rice market or the price of the Globalgap rice is expensive compared with their capability.

In contrast, a Union organization in DaLat city of Vietnam has cooperated agricultural science institutions to improve farming system of vegetable cultivation. The purpose of the cooperation is to produce safe and quality vegetables such as lettuce, flower, pumpkin, cabbage and fruit. The vegetable products are cultivated by applying Globalgap standard, Vietgap standard or safe food standard of Vietnam. Although the production of a small-scale area with 21 hectares, the production serve mainly for hospital and school canteen, restaurants, individual household and export markets (TFVU 2012)

Benefits of the Globalgap rice production for stakeholders

Thanks to the Globaglap rice production, the farmers of the My Thanh cooperative might receive most benefits from applying rice production followed by the Globalgap standard. For instance, the Globalgap rice production helps the farmers enhance their income with 20-30 percent or 30-50 percent increasingly of the Globalgap white rice or the black rice respectively thanks to improve farming system of previous age-old paddy rice production. Applying the Globalgap rice production reduces inputs of rice production. The case study in Kenya also showed income of

the Globalgap producers is increased by ideas of 68 percent in interviewed total producers (Graffham et al. 2007). Besides, the reduction contributes into preserve natural environment by decreasing spraying pesticide and amount of chemical fertilizer. Especially, the Globalgap rice production helps the farmers increase their awareness in activities of daily activities and healthy protection. For example, the house of the Globalgap farmer in the My Thanh cooperative is divided into separate areas such as area of smoking, living room, eating and drinking, and hygiene. In addition, the Globalgap rice production needs being equipped separate areas of storing pesticide, fertilizer, pesticides sprayer and packages and mixing pesticide. The positive activities of workers' healthy and safe improvement are also indicated in the report of the GRASP project. In the project, one of noticeable differences between Globalgap production and non-Globalgap certification is that producers are ensured their work conditions on farms. The Globalgap producers are trained to produce safe products and protect their health thanks to awareness in handling toxic products and dangerous work (Heise et at. 2007). The second stakeholders that are no less importance are customers. The customers are enjoyed the Globalgap rice with safety and high quality. The customers feel secure as eating the rice because the Globalgap rice contains enough information of farm origin as well as its Globalgap standard. Despite payment of the rice with high price in the past, the customers did not really know much about information of the rice clearly. Moreover, some individual customers used to buy the Globalgap rice to make a gift for some enterprises or their friends because they really believe in the quality of the Globalgap rice in the My Thanh cooperative.

The contribution of the Globalgap rice production for the protection of natural environment

The Globalgap rice production plays an important role in protecting natural environment. In the past, the farmers in My Thanh Nam commune sprayed pesticides many times per rice crop. For insect prevention, the times of spraying pesticides were from 2-4 times per crop (Figure 7). Each time was 10-15 days apart. The spraying pesticides happened when they saw damage of the insects on rice without considering the most effectiveness of the spraying. For diseases on rice, the spraying fluctuated from 3-8 times per rice crop. Habit of the spraying mainly was to prevent damage of pathogens. Moreover, about 90 percent of interviewed farmers did not concern poison of pesticides and insecticides with respect to their health and environment around. However, few farmers in the rest percentage also had awareness of protecting their health and natural environment by applying biological pesticides. However, they did not know way to use the biological pesticides. For example, they used to mix many pesticides together by both chemical

and biological pesticides. A study of pesticide use on rice in the Mekong Delta in year 2005 showed that the farmers used different kinds of pesticides to spray on their rice. Besides, the frequency of spraying pesticides in normal rice farming was about 8 times in winter-spring. Whereas the farmers applied integrated pest management reduced down the times of pesticide application from 8 to 3 times at the same figure (Lang et al. 2006 and Corrigan 2010). In fact, the Globalgap rice production reduces times and amount of spraying pesticide and insecticide. The Globalgap farmers apply rule of true four criterions in spraying pesticides and insecticides. Therefore, the spraying is applied just as it is really necessary to kill and prevent pests. In addition, the kinds of pesticides and insecticides are limited in the allowed pesticide and insecticide list. Besides, the Globalgap farmers apply biological pesticides better on their rice. Moreover, the farmers had more favour opportunities of reaching ecological technology in their rice cultivation thanks to participate into farming system of Globalgap rice. Thence, the Globalgap production results in fewer amounts of chemical pesticide and insecticide in environment of soil, water and air. Furthermore, the changes in cleaning pesticide sprayers and mixing pesticides contribute into preservation of water source.

6. Conclusion

The Globalgap rice production changes the face of rural social and economic development in the My Thanh cooperative of My Thanh Nam commune. Thanks to apply the Globalgap rice production, the farmers here can alter technologies of old-age rice farming. The changes of applying good agricultural practice in paddy rice cultivation help the Globalgap farmers increase their life standard through reduction of production inputs and premium price of the harvested Globalgap rice. The farmers are proud of the Globalgap rice production because they can produce rice with safety and high quality for customers. However, the Globalgap rice has not really been provided for local community in My Thanh Nam commune in particular and in the Mekong Delta in general. The premium rice is consumed mainly by most customers with high income in Ho Chi Minh city. Moreover, the Globalgap rice production increases the farmers' awareness in protection of their health and preservation of natural environment through equipment of protective clothes and reduction of supplying pesticides and insecticides on their rice field. Therefore, the Globalgap producers hope that the rice production followed by Globalgap standard will be maintained next following years. They wish the association of the four stakeholders makes possible for them be able to participate and improve the Globalgap rice production thoroughly in future.

Besides of the gained advantages from the Globalgap rice production, the food system of the Globalgap rice has not still met diversity of customers, especially customers with average earnings in the Mekong Delta. The main restriction still is lack of potential guarantors and distributors for the Globalgap rice production. The market outlet is considered very importantly because the explanation and improvement of the Globalgap rice production depend much on its outlet factor. In fact, the Globalgap rice is lacked the competitiveness because of its high price and lack of various varieties in market whereas the supply of the Globalgap rice is deficient.

7. Reference

Anderson L, Gugerty MK, 2010. Environmental Impacts of Agricultural Technologies. Evans school of public affair, Unversity of Washington, 18p.

Bo NV, Mutert E, 2001. Balanced fertilization for better crops in Vietnam.IFA Regional. Conference for Asia and the Pacific, Hanoi, Viet Nam, 18 p.

Burke A, Shipp K, Austin G, 2012. Systems thinking and practice: Diagramming. http://systems.open.ac.uk/materials/T552/pages/rich/richAppendix.html (accessed May 2012).

CDC 2012. Time of GAP (Good Agriculture Practices). http://cdc.org.vn/View/viewevent.aspx?code=64 (accessed May 2012).

Corrigan B, 2010. A realist evaluation of a technology package using a distributed cognition approach An Giang province, Vietnam. Master thesis. Wageningen University, Netherlands, 98 p.

Couprie D, Goodbrand A, Li B, Zhu D, 2012. Soft system methology. http://plaza.ufl.edu/jtruett/abe5643c/ssmfinal.html (accessed May 2012).

Duyen 2011. Soc Trang rice production process Global gap. http://mientaynet.com/khachhang/festivalluagaovietnam.vn/www/index.php?option=content&view=chitiet&id=495 (accessed May 2012).

Dyoulgerov M, 2011. Climate Risk and Adaptation Country Profile. The world bank group, Washington, 14p.

Eilers D, 2009. TÜV SÜD Journal Asia. Editior. Ferndt L, the Franhlin, Singapore, 15 p.

Estellès P, Jensen H, Sánchez L, Vechiu G, 2002. Sustainable Development in the Mekong Delta.

Carter H, Francis CA, Olson R, 1995. Regional training workshops for sustainable agriculture, In: Francis CA, Poincelot RP, Bird GW. Developing and Extending Sustainable Agriculture 2006. The Haworth Press, pp. 157-181.

FAO 1995. Sustainability issues in agricultural and rural development policies. http://www.fao.org/wssd/sard/faodefin_en.htm (accessed May 2012).

FAO 2000. Rice production in the Asia-Pacific region: issues and perspectives. http://www.fao.org/docrep/003/x6905e/x6905e04.htm (accessed May 2012).

FAO 2005. Good agricultural practices and SARD. http://www.fao.org/ag/magazine/0504sp3.htm (accessed May 2012).

FAO 2008. Good agricultural practices.http://www.fao.org/prods/gap/index_en.htm (accessed May 2012).

FAO 2011. Rice market monitor. 14 (2). http://www.fao.org/docrep/014/am491e/am491e00.pdf (accessed May 2012).

FAO 2011. Rice market monitor. 14 (3). http://www.fao.org/docrep/014/am721e/am721e00.pdf (accessed May 2012).

FAO 2012a. Cereal Supply and Demand Brief. http://www.fao.org/worldfoodsituation/wfs-home/csdb/en/ (accessed May 2012).

FAO 2012b. Organic. http://www.fao.org/organicag/oa-faq/oa-faq1/en/ (accessed May 2012).

FAO 2003. Development of a Framework for Good Agricultural Practices. http://www.fao.org/docrep/meeting/006/y8704e.htm (accessed May 2012).

Faurès JM, Hoogeveen J, Bruinsma J. 2012. The Fao Irrigated Area Forecast for 2030. ftp://ftp.fao.org/agl/aglw/docs/fauresetalagadir.pdf (accessed May 2012).

GLOBALG.A.P 2011a. GLOBALG.A.P. http://www.globalgap.org/cms/front_content.php?idcat=9 (accessed May 2012).

GLOBALG.A.P 2011b. A year of initiatives and advances. GLOBALG.A.P Annual Report 2011. http://www.globalgap.org/ (accessed May 2012).

Graffham A, Cooper J, Wainwright H, MacGregor J, 2007. International Institute for environment and Development, London, United Kingdom, 40 p.

GSO 2012a. Yield of paddy by province. http://www.gso.gov.vn/default_en.aspx?tabid=469&idmid=3&ItemID=11773 (accessed July 2012).

GSO 2012b. Planted area of paddy by province. http://www.gso.gov.vn/default_en.aspx?tabid=469&idmid=3&ItemID=11774 (accessed July 2012).

Hamer E, 2008. Fallow and fertile. http://www.theecologist.org/blogs_and_comments/commentators/other_comments/269443/fallow_and_fertile.html (accessed Jun 2012).

Hai LH, 2010. Bao cao ket qua thuc hien du an: Mo rong mo hinh san xuat lua theo tieu chuan Globalgap. Cai Lay, Vietnam, 16 p.

Heise J, Uhlig K, Vonwiller L, 2007. The GRASP project report towards good social practice in agriculture. Federal Ministry for Economic cooperation and Development. Switzerland, 19 p.

HDRA 1998. Natural pest and disease control. http://www.gardenorganic.org.uk/pdfs/international_programme/PestDisease.pdf (accessed July 2012).

Hieu TN, 2008. Phoi lua. https://picasaweb.google.com/lh/photo/6rXs6ePwF1-u-M277XVybw?full-exif=true (accessed Jun 2012).

Horan P, 2000. Using rich pictures in formation systems teaching. http://razvitie.excellence20.com/wp-content/uploads/2012/02/10.1.1.92.6215.pdf (accessed May 2012).

Lang VT, Truc NTT, Xuan HTD, Nam MV, 2006. A comparative study of "three reduction three gain" and popular rice production models in the Mekong Delta of Vietnam.Vietnam, 36 p.

Bhandari B, Johnston K, Truong V, 2009. Investigation of rice kernel cracking and its control in the field and during post-harvest processes in the Mekong Delta of Vietnam. MARD and AusAID, Vietnam and Australia, 72 p.

MARD. 2010. Delta urged to expand quality standards programme for rice. http://www.agroviet.gov.vn/en/Pages/news_detail.aspx?NewsId=470&Page=2# (accessed May 2012).

Musgobozi WL, 2010. Good agricultural practice (GAP) on horticultural production for extension staff in Tanzania. Electronic publishing Policy and support Branch, Rome, Italy, 186 p.

Mutert E, Fairhurst TH, 2002. Rice production special supplement publication: Better crops international. Special supplement 16: 10-17.

Naturland .e.V. 2002. Organic farming in tropics and subtropics. http://www.naturland.de/fileadmin/MDB/documents/Publication/English/rice.pdf (accessed Jun 2012).

Nam NPT, Hiep PM, Nam MV, Trinh BV, Tri PT, 2000. Human resources development in the Mekong Delta. Centre for ASEAN Studies, 21p.

Peaple's Army Newspaper Online. 2012. Rural area programme to be enhanced in 2012. http://www.qdnd.vn/qdndsite/en-US/75/72/182/155/187/175300/Default.aspx (accessed Jun 2012).

Phong T, Net, T, 2012. Nghich ly Globalgap. http://www.baohaugiang.com.vn/newsdetails/2ECC9C0F63/Nghich_ly_GlobalGAP.aspx (accessed May 2012).

PM 2012. Mot so giong lua dac tinh trien vong. http://thuonghieudatviet.com.vn/sites/index.php?act=gioithieu&id=292 (accessed July 2012).

Roderick MR, Mohanty S, Balagtas JV. 2012. Forecasting Global Rice Consumption. http://www.agecon.purdue.edu/staff/balagtas/rice_timeseries_v6.pdf (accessed May 2012)

Vegas P, 2008. The Composition of Rice and Various Processed Types. http://www.sagevfoods.com/MainPages/Rice101/Types.htm (accessed May 2012).

Saichuk JK, Sheffield RE, LeBlanc BD, Girouard E, Hollier CA, Nix K. 2000. Sustainable rice Best management practices.

http://search.lsuagcenter.com/search?site=default_collection&client=default_frontend&output=xml_no_dtd&proxystylesheet=default_frontend&getfields=*&q=sustainable+rice+best+management+pratice (accessed May 2012).

Shigetomi S, Kubo K, Tsukada K, 2011.The world food crisis and the strategies of Asian rice exporters. Spot survey 32, Chiba, IDE-JETRO, Japan, 98 p.

Skaf R, 1993. Sunn pest problems in the Near East. http://www.fao.org/docrep/V9976E/v9976e04.htm (accessed Jun 2012).

Soong J, 2006. Soil fertility and changes in fertilizer use for intensive rice cultivation in the Red River Delta and Mekong Delta of Vietnam. ISP Collection. 35p.

Son 2012. Ruong lau bo hoa than thien moi truong. Nong Nghiep Vietnam. http://nongnghiep.vn/nongnghiepvn/72/2/2/91718/Ruong-lua-bo-hoa-than-thien-moi-truong.aspx (accessed Jun 2012).

Sustainable Table 2012. Sustainable vs. industrial: a comparison http://www.sustainabletable.org/intro/comparison/ (accessed Jun 2012).

TDF 2012. TDF extends microcredits to the poor for water and sanitation improvement. http://dariu.org/en/?vnTRUST=mod:news%7Cact:print%7Cnewsid:51 (accessed Jun 2012).

Than X, 2012. Vietnam lam gap nguoc quy trinh. http://vov.vn/Home/Viet-Nam-lam-GAP-nguoc-quy-trinh/20123/202903.vov (accessed May 2012).

Thao T 2011. Difficult to find businesses companion. http://mientaynet.com/khachhang/festivalluagaovietnam.vn/www/index.php?option=content&view=chitiet&id=529&lang=english (accessed May 2012).

TFVU 2012. The Union's capacity. http://rausach.com.vn/home/index.php?option=com_content&view=article&id=16&Itemid=38&lang=en (accessed July 2012).

Tien Giang 2012. http://www.tiengiang.gov.vn/Xemsn.asp?cap=4&idcha=4253&id=4480 (accessed May 2012).

Tran, Edward, 1997. Doi Moi in Vietnam –A Small Tiger's Growth Spurt Comes to an End". http://www.columbia.edu/cu/ccba/cear/issues/fall97/graphics/regonal/tran/tran.htm (accessed Jun 2012).

Trigo-Stockli DM and Pedersen JR, 1994. Effect of rice storage conditions on the quality of milled rice. Proceeding of the 6th international working conference on stored-product protection 2: 706-711.

Truong V, 2008. Duoc gia nho trong lua ky thuat cao. http://tuoitre.vn/Kinh-te/281854/Duoc-gia-nho-trong-lua-%E2%80%9Cky-thuat-cao%E2%80%9D.html (accessed Jun 2012).

United Nation 2010. The Millennium Development Goals. http://mdgs.un.org/unsd/mdg/Resources/Static/Products/Progress2010/MDG_Report_2010_En.pdf (accessed May 2012).

University of Askansas 2006. Too much nitrogen promotes disease in rice. http://arkansasagnews.uark.edu/762.htm (accessed Jun 2012).

USDA 2012. Grain: World Markets and Trade. http://usda01.library.cornell.edu/usda/current/grain-market/grain-market-03-09-2012.pdf (accessed May 2012).

Vegas P, 2008. The Composition of Rice and Various Processed Types. http://www.sagevfoods.com/MainPages/Rice101/Types.htm (accessed May 2012)

VFA 2012. Introduction. http://www.vietfood.org.vn/en/default.aspx?c=79&n=715 (accessed Jun 2012).

VTV Group 2012. http://vietnamtravels.vn/Vietnam-travel-information/Tien-Giang.htm#top (accessed May 2012).

WFP 2010. Fighter hunger worldwide. http://documents.wfp.org/stellent/groups/public/documents/communications/wfp220666.pdf (accessed May 2012).

Wilson K, Morren GEB, 1990. An introduction to systems thinking and practice, In: Systems approaches for improvement in agriculture and resource management. McMillan, New York, pp. 67 - 115 .

Zoler C, Bruynis C, 2007. Conducting a SWOT Analysis of Your Agricultural Business. http://ohioline.osu.edu/bst-fact/pdf/3611.pdf (accessed May 2012).

Appendix 1:
List of questionnaires for interviewing

Questionnaires to interview Globalgap farmers

Hamlet:……. Date:
.....
Commune:……. Interviewer:
.....
District: Cai Lay
Province: Tien Giang

General information about a farmer

Full name	
Age	
Gender	
Education	
Professional experience	
Years since participating to Global Gap	
Phone number	

Production information

1. Rice area (ha):……/……(Globalgap/non-Globalgap)
2. Rice varieties:
- Before Globalgap production: .....
.....
.....
- After Globalgap production:.....
.....
.....
4. Methods of sowing rice and sowed density
- Before Globalgap production:
The methods of the sowing rice: .....
.....
The sowed density (kg/1000m^2): .....

- After Globalgap production:
The methods of the sowing rice: .....
.....
The sowed density (kg/1000m^2): .....

5. Methods of treating weeds before and after sowing rice
For seeds:
- Before Globalgap production: .....
.....
.....
- After Globalgap production: .....
.....
.....
On the rice field:
- Before Globalgap production: .....
.....
.....
- After Globalgap production: .....
.....
.....
6. What kind of weeds do you think to be difficulty to control? Why are they difficulty to control?

Varieties of weeds	Before Globalgap production		After Globalgap production	
	Ranking	Reasons of the ranking	Ranking	Reasons of the ranking
Echinochloa crus-galli L.				
Leptochloa chinensis				
Fimbristylis Miliacea				
Cyperaceae				
Monochorla Vaginalls				

(Please number 1,2 or 3 with 1 very bad weeds, 2 important weeds, 3 certain important weeds)

7. Different characteristics in seedbed preparation between before and after Globalgap production
- Before Globalgap production.....
.....
.....
.....
- After Globalgap production: .....
.....
.....
.....

8. Fertilization

Information		Before Globalgap production			After Globalgap production		
		Spring-winter	Early autumn-summer	Autumn-summer	Spring-winter	Early autumn-summer	Autumn-summer
Times of supplying fertilizer on field							
Dosage and kinds of fertilizer	Urea						
	DAP						
	NPK						
	Kali						
	PBL						
	Other						

(Urea: 46% nitrogen, DAP: 18% nitrogen - 46% phosphorus, NPK: 20% nitrogen - 20% phosphorus - 15% potassium or 16% nitrogen - 16% phosphorus - 8% potassium, Kali: 60% potassium, PBL: nutrients supplied throught out leaf)

9. If there is difference of amount of applied fertilizer between Globalgap and non-Globalgap production, please explain the difference?

.....
.....
.....
.....

10. Do you apply other fertilizers for rice growth, excepting chemical fertilizers? (other fertilizers such as manure, green manure, compost, residues, etc). If yes, what fertilizers are you applying and how do you apply them?

- Before Globalgap production: .....
.....
.....
.....
- After Globalgap production: .....
.....
.....
.....

11. Why do you use other fertilizers such as manure, green manure, compost and residues? What benefits do you recognise while you apply them on your rice field?

.....
.....
.....
.....
.....

12. Do you breed any animal? If yes, what kinds of animals are you breeding? How do you treat their manure?

.....
.....
.....
.....
.....
.....

13. How many times per a crop do you irrigate water in or drain water out your rice field?

	Times of irrigation	Times of drainage out	Periods of drainage out (age of rice growth)
Spring-winter			
Early autumn-summer			
Autumn-summer			

14. Could you tell me about names of pests that damage on your field? Please supply damage level of the pests? With 1 very strong damage, 2 strong damage, 3 medium damage and 4 low damage.

Before Globalgap production (Names of pests)	Damage level of the pests	After Globalgap production (Names of pests)	Damage level of the pests

15. Stituation of using pesticides on rice:
- Before Globalgap production
Which pesticide and period of spraying pesticides did you apply on your rice field?

Order number	Which pesticide	Period of spraying pesticides (Date after sowing seed)	Main reason of spraying pesticides (preventing or killing

Were you interested in poisonous and dosage of pesticides on pests when you decided to spray the pesticides on your field? For example,
+ Did you often apply pesticides with narrow spectrum or wide spectrum on your rice field? Why did you dicide this? Did you apply pesticides that damage less effect on enemies and environment when you decided to use them?

.....
.....
.....
.....
.....

+ Did you apply right dosage of pesticides based on label of pesticide package? If not, why did you change it?

.....
.....
.....
.....
.....
.....

16. Do you meet any difficulty with Globalgap production when you have to use pesticides in allowed nomenclature?

.....
.....
.....
.....

17. Do you meet any difficulty in protecting rice growth by damages of pests (Suggesting if it is necessary, for example is pesticides resistance of pests. How do you recognise the resistance? Or what did you do to solve the pesticide resistence?)

- Before Globalgap production: .....
.....
.....
.....
- After Globalgap production: .....
.....
.....
.....

18. Do you wear mask, gloves, glasses and protective clothes while you are spraying pesticides?

- Before Globalgap production: .....
.....
- After Globalgap production: .....
.....

19. Do you feel healthier after spraying pesticides on the rice field if you wear protective equipment? .....
.....

20. Did you build separate places for mixing pesticides, storing fertilizer and pesticides, containing packages of pesticides before participating in Globalgap production? Yes or No, its reason?

.....
.....
.....
.....

Where did you mix pesticides before?: .....
.....
.....

What did you do with packages of pesticides after using them? .....
.....
.....

21. What did you change with Globalgap practices? How do you think about the change?
.....
.....
.....
.....

22. What do you think about your current manangement (mixing pesticides, storing fertilizer and pesticides, solving packages of pesticides) in relation sto environment ?
.....
.....
.....

23. Do you apply orther ways in pest management? (protecting enemies, using pest trap, practing integrated pest management).
- Before Globalgap production: .....
.....
.....
.....
.....
- After Globalgap production:.....
.....
.....
.....
.....

24. Did you take any training courses of agricultural knowledge before? If yes, How many courses did you take? And what were their content?

Information	Before Globalgap production			After Globalgap production		
Name of courses						
The courses' content						

25. What training course did you satisfy best? Why did you satisfy the courses?
.....
.....
.....

26. How do you harvest rice?

	Before Globalgap production	After Globalgap production
Employing workers to harvesting		
Using rice harvesting machine		
Yourself, family members harvesting rice by hand		

27. What difficulties did you meet during harvesting rice? How did you meet the difficulties?

	Before Globalgap production		
	Spring-winter	Early autumn-summer	Autumn-summer
Employing workers			
Transporting rice			
(Weather)			
	After Globalgap production		
	Spring-winter	Early autumn-summer	Autumn-summer
Employing workers			
Transporting rice			
Weather			

28. Do you meet any dificulty in dry rice in the sun and storing rice?

	Globalgap production		
	Spring-winter	Early autumn-summer	Autumn-summer
Dry rice			
Rice storage			

29. What did you do with rice straw after harvesting rice? Why did you decide this?

	Before Globalgap production		
	Spring-winter	Early autumn-summer	Autumn-summer
Rice straw			
Reason			
	After Globalgap production		
	Spring-winter	Early autumn-summer	Autumn-summer
Rice straw			
Reason			

30. Where do you get rice seeds from?

- Before Globalgap production:

.....

.....

.....

Do you often keep for seeds theirselves for next crops?.....If yes, how do you choose the seeds?

.....

.....

.....

If you cultivate one kind of rice variety for from two to three crops yearly, the rice variety of what crop is chosen reproduce?

Spring-winter: ☐

Early autumn-summer : ☐

Autumn-summer: ☐

All three crops: □

Why do you choose the reproductive way?

.....
.....
.....

How long do you change other rice variety?:……why do you change it?.....

.....
.....

- After Globalgap production:

.....
.....
.....

31. Do you have a better income by applying Globalgap production? How much percentage is it higher yearly compared with non-Globalgap production?

.....
.....
.....

32. If yes, What are the factors in your opinion that increased your income from Globalgap production? Please number 1,2,3,4 or 5 with 1: very important factor, 2: important factor, 3: medium important, 4: low important, 5: no change?

	Spring-winter	Early autumn-summer	Autumn-summer	Ranking
Rice seed quality				
Yield				
Amount of using pesticides				
Amount of using Fertilizer				
Rice price				
Friendly environmment				

Please explain reasons of factors that you dicide important level?

.....
.....
.....
.....
.....
.....

33. Are you cultivating other crops? Please tell their names and their importance for your farm (income or food)?

.....
.....
.....
.....

34. Are you satisfied with payment (time and price) of ADC company from Globalgap rice production?

.....
.....
.....

35. If not, what wil you expect to improve your production?

.....
.....
.....
.....
.....
.....

36. What difficulties might appear if associations/institutions of stakeholders will not be continued?

Government.....
.....
.....
.....
.....

Scientist.....
.....
.....
.....

Farmer.....
.....
.....
.....

Businessman.....
.....
.....
.....

37. Do you receive any support from these four associations/institutions?

.....
.....
.....
.....

38. What purpose did you use the support for in Globalgap rice production?

.....
.....
.....
.....

39. Could you continue maintaining the farming system of Globalgap rice production if the association stops? Is yes, how?

.....
.....
.....

40. Is the farming system of Globalgap rice production always stable last years? If yes, what factors have contributed the stability?

.....
.....
.....
.....

41. Do you think that you are a typical farmer by applying Globalgap rice production? Why do you think that?

.....

.....
.....
.....

42. Do you think that protecting natural environment from applying Globalgap rice production brings benefits in your life and in the life of others?

.....
.....
.....

43. If non-Globalgap farms are located very closely with your farm, have you been applying any solution to protect your Globalgap rice production from effects of chemical fertilizers and pesticides by non-Globalgap farms around?

.....
.....
.....
.....

Notes:

- Each interview lasts about 150 minutes
- Besides interviews, visiting fields is asked to understand better about current farming system as well as figure out rich picture

Questionnaire for Globalgap wholesalers/retailers

1. How long have you done business of Globalgap rice?

☐ 1 year ☐ 2 years ☐ 3 years ☐ 4 years ☐ 5 years

2. What criteria of the rice that customers often ask is relevant to below evaluation?

1. Not important 2. Less important 3. Important
4. Important very much 6. Do not know

☐ High nutrients

☐ Having a clear origin (be able to track back to productive origin)

☐ Price (low or high)

☐ Good taste and comfortable feel when you eat it (based on characteristics of rice)

☐ Importing rice

☐ Rice with disease resistence

☐ Rice not broken

☐ Ohter

3. What difficulties do you often meet in your rice business?

☐ Price ☐ New trademarks of rice ☐ Origin of rice is unclear

☐ New characteristics of rice ☐ Other….

Please explain reasons for your choice?

.....

.....

To new customers who buy Globalgap rice in your shop? How could you convince the customers to buy Globalgap rice successfully? What difficulties in Globalgap rice business do you meet?

.....

.....

4. Do you distribute Globalgap rice to other retailers? Why do you distribute it to the other retailers? In which do you often distribute it?

5. How often customers below buy Globalgap rice?

1. Sometimes 2. Often 3. Very often 4. Not buy

☐ People who have a low income

☐ People who have a medium income

☐ People who have with a higher income

☐ Householders

☐ Students

☐ Food shops/companies

6. How many kilograms of Globalgap rice within a month do customers often buy that is relevant to below choice?

1. People who have a low income
2. People who have a medium income
3. People who have with a higher income
4. Householders
5. Students
6. Food shops/companies

☐ 1- 10 kg ☐ 10-20 kg ☐ 20-30 kg ☐ 30-40 kg ☐ 40-50 kg ☐ > 50 kg

7. How do you think about potential outlet of Globalgap rice compared with other high quality or importing rice?

☐ Less potential ☐ Potential ☐ More potential

8. Which ideas do you want to contribute to Globalgap rice market in Mekong Delta of Vietnam?

.....
.....

- To business

.....
.....

- To customers

.....
.....

- To producers

.....
.....

- To your rice retailer

.....

Questionnaire for Globalgap customers

1. Why have you decided to choose Global rice?

.....

.....

2. What do you think about costs of the Globalgap rice that you bought? Prices are too...

☐ Low ☐ Medium ☐ High ☐ Very high

3. How is the Globalgap rice available in the shop?

☐ Seldom ☐ Sometimes ☐ Most time ☐ Always

4. How do you think about the quality of the Globalgap rice that you bought?

☐ Low quality ☐ Average quality ☐ High quality

6. How many kinds of Globalgap rice with different productive origin do you know in market?

☐ One ☐ Two ☐ Three ☐ Other……..

What are their names? Where are they from? What kind of Globalgap rice do you often buy? And why do you choose it?

☐ High quality ☐ Clear origin ☐ Price ☐ Good taste and comfortable feel when you eat it ☐ Other……..

.....

.....

7. How do you trust in the trademark of the Globalgap rice that you buy?

☐ No trust ☐ Little ☐ Average ☐ Trust ☐ High trust

Could you explain this?

.....

.....

8. How many kilograms of the Globalgap rice do you buy per month?

☐ 1- 10 kg ☐ 10-20 kg ☐ 20-30 kg ☐ 30-40 kg ☐ 40-50 kg ☐ > 50 kg

9. What sugguestions or ideas do you have for improving the quality of the Globalgap rice?

.....

.....

11. Do you or did you already eat rice that was cultivated outside Vietname?

☐ No, I only eat Vietnamese rice ☐ Sometimes ☐ Often ☐ Usually

12. What did you think when you ate imported rice?

☐ Not satisfied ☐ Lowly satisfied ☐ Satisfied ☐ Very satisfied

13. Do you encourage other people to buy the Globalgap rice?

☐ Your family ☐ Your neighbors ☐ Your colleague ☐ Food shop ☐ Other……

Questionnaires to interview non-Globalgap farmers

Hamlet:……. Date:
.....
Commune:……. Interviewer:
.....
District: Cai Lay
Province: Tien Giang

General information about a farmer

Full name	
Age	
Gender	
Education	
Professional experience	
Phone number	

Production information

1. Rice area (ha): .....
2. Are you growing any crop? Please tell their names and their roles for your farm (income or food)?
.....
.....
.....
.....
3. Do you breed any animal? If yes, what kinds of animals are you breeding? How do you treat their manure?
.....
.....
.....
.....
.....
.....
4. Did you hear or do you know about Globalgap rice production? If yes, where did you hear about it or where did you get information? If yes, could you tell me what information you have about it?
.....

.....
.....
.....
.....

5. Do you think that Globalgap rice production can bring benefits ? Could you tell me benefits that you know?

.....
.....
.....
.....
.....

7. Do you apply any knowledge that you know about Globalgap rice production on your rice field ? Why and which knowledge/practice do you apply it?

.....
.....
.....
.....
.....
.....

8. Would you be interested to participate in Globalgap rice production ?
If not, why not ? What important difficuties might you have to meet when you adopt Globalgap rice production ?

.....
.....
.....
.....
.....

Is yes? Why do you want to adopt it?

.....
.....
.....
.....

9. If you participate in it, what will you expect from associations/institutions of stakeholders?
Government.....
.....
.....
.....
Scientist.....
.....
.....
.....
Farmer.....
.....
.....
.....
Businessman.....
.....
.....

10. Where do you dry rice after harvesting your crop? What difficulties do you meet while you dry rice?

.....

.....
.....
11. Who and where do you sell rice for you after harvesting? What difficulties do you meet in selling?
.....
.....
.....
12. Where did you mix pesticides before?:.....
.....
.....
What did you do with packages of pesticides after using them? .....
.....
.....
.....
Did you build separate places for mixing pesticides, storing fertilizer and pesticides, containing packages of pesticides? If not, where do you put them?
.....
.....
.....

13. About four latest years, do you take any workshop/training about agricultural technological and scientific knowledge to improve your rice production? If yes, what was its content?
.....
.....
.....
.....
Besides, do you get any loam fund from government bank? If yes, what do you do with the fund?
.....
.....
.....
.....

14. Globalgap rice production is supported to reduce investable capital and increase income thanks to reduce amount of fertilizer and pesticide, cut down number of sowing seeds, improve rice quality. If you are trained to produce Globalgap rice, would you participate in the production though there is not guarantee of rice price after harvesting? Why?
.....
.....
.....
.....
15. Globalgap rice production demands to practiced culture of rice production such as guarantee safely period of using pesticides before harvesting rice, use pesticedes fowllowing allowed nomenclature, wear mask, gloves, glasses and protective clothes and so on while you are spraying pesticides and write down what you will do in Globalgap rice production. What difficulties do you think will you have when you decide to take it? Why?
.....
.....
.....
16. Preserving environment plays an important role of whole public. In your production and life activities, do you contribute to protect natural environment? What do you do?

Questionnaire for Non-Globalgap wholesalers/retailers

1. What do you know about Globalgap rice?

☐ Yes ☐ No

2. Do you sell customers any rice with high quality?

☐ Yes ☐ No

What are their names?

.....

.....

.....

3. What criteria of the rice do customers often ask is relevant to below evaluation?

1. Not interested 2. Less interesred 4. Interested
5. Interested very much 6. Do not know

☐ not containing microorganism

☐ Not containning surplus of pesticides and ferticides

☐ High nutrients

☐ Having a clear origin (be able to track back to productive origin)

☐ Price (low or high)

☐ Good taste and comfortable feel when you eat it (based on characteristics of rice)

☐ Importing rice

☐ Rice with disease resistence

☐ Rice not or less broken

4. Do you think that you have also chosen the above criteria to sell customers rice? If not, which important ideas do you consider that they are suitable with customers' criteria or your business?

1. Not important 2. Less important 3. Important
4. Important very much 6. Do not take care of

☐ not containing microorganism

☐ Not containning surplus of pesticides and ferticides

☐ High nutrients

☐ Having a clear origin (be able to track back to productive origin)

☐ Price (low or high)

☐ Good taste and comfortable feel when you eat it (based on characteristics of rice)

☐ Importing rice

☐ Rice with disease resistence

☐ Rice not or less broken

☐ Ohters.....

5. If there is a rice variety that hold some criterions such as not containing microorganism, not containning surplus of pesticides and ferticides, high quality, having good taste and comfortable feel when you eat it and coming from a clear origin; however, its cost is higer than price of the same rice variety in markets, do you accept to sell it?

☐ Yes ☐ No

What are reasons of your choice?

6. What do you know about productive origin of any rice that you sell customers? And How do you know about it?

7. What criterions of rice do you choose to use in your daily meal?

☐ Rice with safe quality

☐ High nutrients

☐ Having a clear origin (be able to track back to productive origin)

☐ Price (low or high)

☐ Good taste and comfortable feel when you eat it (based on characteristics of rice)

☐ Importing rice

☐ Other.....

8. How many kilograms of rice do customers buy that is relevant to below choice?

1. People who have a low income
2. People who have a medium income
3. People who have with a higher income
4. Householders
5. Students
6. Food shops/companies

☐ 1- 10 kg ☐ 10-20 kg ☐ 20-30 kg ☐ 30-40 kg ☐ 40-50 kg ☐ > 50 kg

9. Is there any customer who come to buy Globalgap rice in your shop? Do you think that you will sell customers Globalgap rice in the future? Why do think this?

.....
.....
.....
.....
.....
.....

10. What criteria of rice will customers expect to enjoy in the future according to your ideas? What reason for your answer?

.....
.....
.....
.....

Questionnaire for non-Globalgap customers

1. What criteria do you choose to buy rice?

☐ Quality ☐ Price ☐ Clear origin ☐ Imported rice ☐ Good taste and comfortable feeling when you eat it ☐ Rice colour ☐ Other…….

Why do you choose the criteria?

.....
.....
.....
.....

2. What do you know about Globalgap rice?

☐ Nothing ☐ A little bit ☐ Quite alot

What information do you have about the Global rice?

☐ High quality

☐ Have a clear origin

☐ No surplus of volume of pesticide and fertilizer

☐ Limiting accepted concentration of heavy metals in soil such as copper, cadimi, zinc, lead, arsenic and quicksilver

☐ Not containing microorganism such as bacteria, fungi, virus, microbe

☐ Other…….

3. How many variety of rice with Globalgap standard do you know in market?

☐ One ☐ Two ☐ Three ☐ Other……..

What are their names? Where are they from?.....
.....
.....
.....

4. Firstly introduce to customers some main characteristics of Globalgap rice in My Thanh cooperative such as no surplus of volume of pesticide and fertilizer, no microorganism, not containing heavy metals, containing a clear origin, high quality. According to your citerions of choosing rice, how many percentage can the Globalgap rice indicate?

☐ 0-20% ☐ 20-40% ☐ 40-60% ☐ 60-80% ☐ 80-100%

What are reasons of your choice?

.....
.....
.....

How much more Dong per kg are you ready to pay for the rice with the above described criteria?

.....
.....
.....

What is the most important criteria you are willing to pay more for it?

.....

.....
.....

5. Do you feel comfortable with the rice that you often eat in your daily diets?

☐ Not comfortable ☐ Little comfortable ☐ Comfortable ☐ Very comfortable

What are names of the rice that you often buy? What are reasons of your choice?

.....
.....
.....
.....

6. How do you know about origin of the rice that you often buy?

.....
.....
.....
.....

7. What criteria of the rice that you often buy are relevant to below evaluation?

1. Not important 2. Less important 3. Important
4. Very important 5. Do not know

☐ Not containing microorganism such as bacteria, fungi, virus, microbe

☐ Not containning surplus of pesticides and ferticides

☐ High nutrient

☐ Having a clear origin (be able to track back to productive origin)

☐ Price (low or high)

☐ Good taste and comfortable feel when you eat it (based on characteristics of rice)

☐ Importing rice

☐ Rice with disease resistence

☐ Rice not or less broken

8. Do you believe in the trademark of this rice when you hear about characteristics of Globalgap rice.?

1. No belief 2. Low belief 4. Belief 5. High belief

What reason is it for your choice?

.....
.....
.....

Questionnaire for government and scientists by Globalgap production

- For Government (*Note: Department of Agriculture of Cai Lay District, Tien Giang Province, Vietnam, The department plays role in guiding and conducting standards of the Globalgap rice production)*

1. What is your detailed role in Globalgap rice production?

2. Was your institution implicated in the creation of the cooperative? If yes, how?

3. Could you tell me the implication of your institution in history of My Thanh cooperative? What were the purposes of creating My Thanh cooperative?

4. What difficulties have Globalgap rice production in My Thanh cooperative had to meet? What solutions have been implemented to solve the existing difficulties?

5. Did Globalgap farmers use to participate "high quality and safety rice" in My Thanh coperative? If yes, do you think that it is a positive point for farmers to reach Globalgap production better? Why do you think that? *(Note: Before Globalgap farmers has participated Globalgap rice cultivation. The farmers be trained about the production of "high quality and safety rice" by applying new management and technology in My Thanh commune. For example, integrated pest management (IPM) has applied since 1995 in My Thanh commune. Three years later, the farmers have continued applying "rice seed health". Nextly, the programme of "clean rice fields" and "3 down, 3 up" has applied in 2002, 2003 respectively. From 2004 to 2006, the model of "high quality and safety rice" production was applied in My Thanh copperative. Beside, the new technology included row sowing with thin density (100 kilokrams of rice seed per hectare), using "rice seed health", supplying balanced and resonable fertilizer, using biological pesticides and only using pesticides if it is really neccesary. Source: http://cdc.org.vn/View/viewevent.aspx?code=64)*

6. How can My Thanh cooperative maintain Globalgap rice production yearly?

7. What any other projects or studies in My Thanh commune have been carried out that applied the Globalgap production? Were there any specific projects to use natural resources effectively, reduce chemical fetilizer and pesticides and keep environment friendly? What were their purposes? (*note: There were some different projects that supported for rural agricultural development in My Thanh Nam commune. The Globalgap producers might be favoured firstly to participate into the projects. For example, the projects were often related to ecology or integrated pest management to attract enemies for protecting crops. At that time, there were some demonstrations or practical studies on the of the Globalgap producers. So, I want to know more detail information)*

8. Which other institutions are implicated in Globalgap rice production in the Mekong delta? What are their roles and functions? Are they implicated also in My Thanh cooperative?

9. In Globalgap production, producers have to apply fertilizers and pesticides based on permited nomenclature. What did your institution or the cooperative chairman do or will do in the case that producers apply other fertilizers and pesticides from companies outside in Globalgap production?

10. What gains or benefits do you think has Globalgap rice production achieved to contribute sustainable agricultural development?

11. What plans will your institution carry out to improve and enlarge Globalgap rice production in the future?

12. How will Globalgap rice production in the Mekong delta look like in the future? What is your vision?

- For Scientists *(Note: Tien Giang Department of Science and Technology, the department plays role in advising and trainning Globalgap rice production)*

1. What is your detailed role in Globalgap rice production?

2. Could you tell me about history of Globalgap rice production in the Vietnam and more specifically in the Mekong delta ? Why was rice production with Globalgap standards implemented in My Thanh cooperative?

3. How do you carry out advise or trainning farmers in supplying knowledge about Globalgap rice production. How do to take into account different levels of education. Which difficulties did you meet in advising or trainning? What are your experiences from advising or trainning meetings ?

4. Which institutions in the Mekong delta and more specific in My Thanh commune are certificated for Globalgap?

5.Which main standards does Globalgap rice production need to gain recertification the production next years? What difficulties are there in getting certification and recertification of Globalgap rice production? (*Note: The certification of Globalgap rice production only value one year. Yearly cooperative chairman has to submit to certificated institution to consider and process recertification*)

6. Where do funds for certification and recertification come from?

7. What surveys about rice varieties have been carried out to evaluate the demand of customers, requirements of farmers and consider climate characterstics. What are main and secondary characteristics of rice race chosen to be applied in Globalgap production and why are they chosen? *(Note: because over three year of rice Globalgap production in My Thanh coperative, a rice variety favours a large market. However, the characteristic of the rice variety is long-day. As a result, it is some difficulties to cultivate three crops in a year while the flooding yearly comes earlier. This affected sowing and harvesting date. Now another kind of rice variety is being cultivated (its name is "Cai Lay cam rice"). It is short-day. But, there is some difficulties in outlet)*

9. How will Globalgap rice production in the Mekong delta look like in the future? What is your vision?

Quesionnaire for business

1. What is your company role in Globalgap rice production or marketing?

2. What are the results or outcomes of your company in participating to Globalgap rice production in My Thanh cooperative?

3. What did your company invest in Globalgap rice production in My Thanh cooperative last years?

4. How do your company carry out the purchase of Globalgap rice in My Thanh cooperative? Are you already implicated in harvesting?

5. What can you tell me about outlets of Globalgap rice from your company? At which type of market are you focusing?

6. What difficulties do your company have with distribution of Globalgap rice? Can you explain them? What is the difference in price compared with other kinds of rice?

7. How long does it take until your company has sold all of Globalgap rice after each harvest?

8. What advantagous characteristics do Globalgap rice have to compete with other kinds of rice?

9.Why have your company implemented "Cai Lay cam rice" production in My Thanh cooperative? This is a fair new rice variety to customers. What difficulties have your company perceived with the production and the outlet? *(Note: I mentioned by previous email. Now, My Thanh cooperate has cultivated another kind of rice variety with a third of total area. Its name is called "Cai Lay cam rice" or "black rice". Its growth is short-day,lasting about 70-80 days. Although its outlet area are small , its cost is about 1.6 times higher than some other quality other rice. It can create high disease resistance. Source: http://www.brt.vn/135/32099/New-rice-variety-produced-in-Mekong-Delta.htm)*

10. What do you think in general about potential outlet of Globalgap rice in Vietnam and the Mekong delta in particular? What about actual exportation trends?

11. How much time after harvesting rice does it take until your company pays My Thanh cooperative? Are there any difficulties related to the payments?

12. Does your company guarantee harvesting rice for one hundred percentage of Globalgap farmers in My Thanh cooperative every harvest? If not, why can your company not guarantee tp purchase all harvested rice from all of the farmers? How does your company maintain the cooperation for next crops? What difficulties do your company meet in the maintaining relationship with My Thanh cooperative?

13. What further plan do your company have to implement more Globalgap rice production?

14. How can your company protect and improve the trademark of Globalgap rice for customers?

Appendix 2

List of interviewing Globalgap farmers of the My Thanh cooperative

Farmer number	Age	Professional experience (Years)	Area of Globalgap rice (ha)	Group
Farmer 1	37	19	1.5	1
Farmer 2	35	15	0.5	1
Farmer 3	45	20	0.4	1
Farmer 4	55	More 30	1.0	1
Farmer 5	55	37	0.5	2
Farmer 6	56	More 30	0.3	2
Farmer 7	42	30	1.0	2
Farmer 8	52	35	1.0	3
Farmer 9	24	6	3.0	3
Farmer 10	46	30	0.6	3
Farmer 11	43	30	0.5	3
Farmer 12	48	25	0.5	3
Farmer 13	54	20	1.5	3
Farmer 14	57	28	1.6	3
Farmer 15	49	20	0.2	3
Farmer 16	37	37	0.8	3
Farmer 17	45	More 10	1.2	5
Farmer 18	50	22	0.8	5

Appendix 3

List of interviewing non-Globalgap farmers of the My Thanh cooperative

Farmer number	Age	Professional experience (Years)	Area of Globalgap rice (ha)
Farmer 19	37	18	0.9
Farmer 20	35	16	1.4
Farmer 21	45	23	2.5
Farmer 22	55	20	1.3
Farmer 23	55	38	1.5

Appendix 4

List of interviewing scientist and government stakeholders

Stakeholders	Address
Local government stakeholder	Department of Agriculture and Rural Development of Cai Lay district
Scientist stakeholder	Tien Giang Bio-Technology technical center
Engineering stakeholder	Department of Agriculture and Rural Development of Cai Lay district

Appendix 5

List of interviewed stakeholders in the food system of the Globalgap rice

Stakeholders	Address	Notes
Scientist stakeholder	ADC Company	Globalgap rice professional
Business stakeholder	ADC Company	Globalgap rice professional
Business staff	ADC Company	
Engineering stakeholder	ADC Company	
Business staff	ADC Company	
Globalgap retailer	Ho Chi Minh city	Retail stores of both Globalgap and non-Globalgap rice
Globalgap retailer		
Globalgap retailer		
Non-Globalgap retailer	Ho Chi Minh city	Retail stores of only non-Globalgap rice
Non-Globalgap retailer		
Manager of kindergarten	Ho Chi Minh city	

Appendix 6

List of four stakeholders

Organisation/Individual	Role of stakeholder
Department of Agriculture and Rural Development of Cai Lay district	Local government
Tien Giang Bio-Technology technical center	Scientist
ADC company	Guarantor & Distributor
Farmers	Producers

Appendix 7

Situation of fertilizer applied before and after participating in the Globalgap rice

Farmer number	Average amount of chemical fertilizer per crop (kg/1000m^2)		Situation of applying synthesis organic fertilizer (Yes/No)	
	Before Globalgap production	After Globalgap production	Before Globalgap production	After Globalgap production
Farmer 1	45	35	No	Yes
Farmer 2	40	40	Yes	Yes
Farmer 3	50	43	No	No
Farmer 4	36	30	No	No
Farmer 5	30	30	No	No
Farmer 6	35	30	No	No
Farmer 7	45	40	No	No
Farmer 8	40	30	No	Yes
Farmer 9	45	40	Yes	No
Farmer 10	45	35	No	No
Farmer 11	40	30	No	No
Farmer 12	45	35	No	No
Farmer 13	50	40	No	Yes
Farmer 14	35	30	No	No
Farmer 15	40	35	No	No
Farmer 16	35	30	No	Yes

Farmer 17	35	30	No	Yes
Farmer 18	35	32	No	Yes

Appendix 8

Suggested questions for discussion of visioning year 2020

Group plays a role as government

- What do you support for Globalgap rice production of My Thanh cooperative in 2020?
- How do you widen area of Globalgap rice production as well as increase farmers' participation?
- How can you enhance the cooperation of four stakeholders: government, scientist, farmer and business?

Group plays a role as scientist

- What contributions of improving rice variety and farming system do you want to approach for Globalgap rice production in 2020? Why do you want to improve them?

Group plays a role as farmer

- What do you imagine about Globalgap rice production in 2020?
- Will all farmers join in to Globalgap rice production until 2020? What reasons for your answer?
- How will the farming system look like in 2020?

Group plays a role as business/distributor

- What do you invest in Globalgap rice production in 2020? Why do you want to invest? What are your investments to improve Globalgap rice production in My Thanh cooperative?
- How can you attract more farmers who want to participate Globalgap rice production in 2020?
- What do you think about Globalgap rice consumtion in 2020? What solutions do you want to suggest to improve the consumtion force of Globalgap rice in 2020?

Group plays a role as consumer

- Do you support to use Globalgap rice in 2020? What is your support? Why do you think that the support is necessary?

How is customers' taste about rice quality and shape in 2020?