REPUBLIC OF TURKEY
ONDOKUZ MAYIS UNIVERSITY
INSTITUTE OF SCIENCE

THE COMPARISON OF AGRICULTURAL KNOWLEDGE AND INFORMATION SYSTEMS (AKIS) FOR ADOPTERS AND NON-ADOPTERS OF GOOD AGRICULTURAL PRACTICES (GAPs) IN BAFRA DISTRICT OF SAMSUN, TURKEY

MASTER'S DEGREE THESIS

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JANUARY, 2016
SAMSUN

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DEPARTMENT OF AGRICULTURAL ECONOMICS

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SUBMITTED TO THE INSTITUTE OF SCIENCE IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE MASTER'S DEGREE

Thesis Defense Date : 07/01/2016

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This work has been recognized as entitled Master's Degree Thesis with exam held on 07/01/2016 by the jury.

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AKCNOWLEDGEMENTS

I thank to ALLAH for the strength and the guidance that he has given me to understand the meaning and the light that knowledge brings. I would like to thank my supervisor Associate Prof. Dr. Kurşat Demiryürek, for his valuable guidance, useful suggestions, that he gave me and helped me to finish my masters' thesis. I would also like to thank Assistant Prof. Dr. Ferhat Öztürk, for his checking and proof reading of my thesis.

I am grateful to Nur Ilkay Abacı, Mehmet Aydoğan, Emrah Ildeniz and Mesut Yilmaz, who helped me during a survey and collecting of data. I am also grateful to the farmers in Bafra for their hospitality and useful respondents that helped me to get a good result. I am also grateful to the chairman Mehmet Şahın, Havvanur Bekar and other agricultural adviser of Bafra Vegetable Producers' Union for their support and contribution during data collection.

My sincere thanks go to the Republic of Turkey and Turkey Bursları (Scholarships) for supporting and providing me the scholarship. Without that support, this work would not have been possible. I would like to thank the rector of Ondokuz Mayis University, Prof. Dr. Huseyin Akan, the Director of Institute of Science, Prof. Dr. Huseyin Demir and the Dean of the Faculty of Agriculture, Prof. Dr. Orhan Kurt. My special thanks go to my Head of Department of Agricultural Economics, Prof. Dr. Ismet Boz. I would also like to thank my all professors at the Department of Agricultural Economics, Prof. Dr. Vedat Ceyhan, Associate Prof. Dr. Mehmet Bozoğlu, Associate Prof. Dr. Osman Kılıç and all research assistants.

I am thankful for my beloved family (my father, Abdulkadir Abdurahman H. Elmi and my mother Shamis Hussein Bulale) who nurtured me, educate me and supporting me spiritually throughout my life. I would also like to thank my brothers, Elmi, Mohamed, Awale and my sisters Amina and Ayan, for their encouragement and motivating me throughout writing this thesis.

Finally, I take this opportunity to express my gratitude to all friends in Samsun city, for their encouragement and support during the writing of my thesis. I also place on record, my sense of gratitude to one and all, who directly or indirectly, have lent their hand in this thesis.

TABLE OF CONTENTS

Page

LIST OF TABLES **Page**

LIST OF FIGURES **Page**

ABBREVIATIONS

AKIS	**:** Agricultural Knowledge and Information System
AIS	**:** Agricultural Information System
AKS	**:**Agricultural Knowledge System
BVPU	**:**Bafra Vegetable Producers' Union
CDC	**:**Center for Disease Control and Prevention
CSO	**:**Civil Society Organization
EU	**:**European Union
EUREPGAP	**:**Euro-Retailer Produce Working Group
FAO	**:**Food and Agriculture Organization of the United Nation
GAPs	**:**Good Agricultural Practices
GLOBALGAP	**:**GLOBAL Good Agricultural Practices
GMP	**:**Good Manufacturing Practices
HACCP	**:**The Hazard Analysis Critical Control Point
ICM	**:**Integrated Crop Management
IPM	**:**Integrated Pest Management
MFAL	**:**Ministry of Food, Agriculture and Livestock
NGO	**:**Non-Governmental Organization
SII	**:**Social Insurance Institution
SPS	**:**Sanitary and Phytosanitary Standards
SPPS	**:**Statistical Package for the Social Sciences
TIS	**:**Total Information Score
TOT	**:**Transfer of Technology
TZOB	**:**Local Chambers of Agriculture
UNCTAD	**:**United Nations Conference on Trade and Development
WHO	**:**World Health Organization

THE COMPARISON OF AGRICULTURAL KNOWLEDGE AND INFORMATION SYSTEMS (AKIS) FOR ADOPTERS AND NON-ADOPTERS OF GOOD AGRICULTURAL PRACTICES (GAPs) IN BAFRA DISTRICT OF SAMSUN, TURKEY

ABSTRACT

The purpose of the thesis is to compare Agricultural Knowledge and Information Systems (AKIS) for adopters and non-adopters of Good Agricultural Practices (GAPs) in the Bafra district of Samsun, Turkey. AKIS comprise the institutions and organizations that generate and disseminate knowledge and information to support agricultural production, marketing, and post-harvest handling of agricultural products and management of natural resources. Good Agricultural Practices (GAPs) should be environmentally sound, economically viable and socially acceptable, and result in safe and healthy food and non-food agricultural products. The main materials of this study are the data obtained from a survey with adopters and non-adopters of GAPs in Bafra district. The research data were collected from 77 farmers contained both adopters and non-adopters of GAPs. Statistical analysis, such as Chi-square and t-test was used. The study results presented the socio-economic characteristics of farmers were presented. There was significantly different between adopters and non-adopters of GAPs, according to household size, organizational membership, farm size, livestock and crop production. Meanwhile, the information sources like a district agricultural manager/personnel, union adviser of the farmers' association (GAPs) and pesticide/fertilizer dealers were preferred the main sources of agricultural information for adopters of GAPs. However, it recommended that information sources like research institute, university and cooperatives needs to be improved by strengthening their way of information dissemination. In terms of usefulness of AKIS for this study, it seems that this system was insufficient to analyze this study. Even though the functions of this system are essential elements, they are insufficient for establishing a network of complex innovation-oriented institutional arrangements. In the future, this study suggests that to analyze GAPs it needs to use Agricultural Knowledge and Innovation System (AKIS) approach, because this system have many interaction networks that can facilitate the researchers to reach the innovation easily to the intended farmers.

Key Words: Agricultural Knowledge and Information Systems (AKIS); Good Agricultural Practices (GAPs); Bafra.

SAMSUN İLİ BAFRA İLÇESİNDE İYİ TARIM UYGULAMASI (İTU) YAPAN VE YAPMAYAN ÇİFTÇİLERİN TARIMSAL BİLGİ VE ENFORMASYON SİSTEMLERİ (TBES)'NİN KARŞILAŞTIRILMASI

ÖZET

Tezin amacı Samsun ili Bafra ilçesinde İyi Tarım Uygulaması (İTU) yapan ve yapmayan çiftçilerin Tarımsal Bilgi ve Enformasyon Sistemleri (TBES)'ni karşılaştırmaktır. TBES doğal kaynaklar ile tarım ürünlerinin üretim, yönetim ve pazarlamasına ilişkin çiftçilere bilgi ve enformasyon desteği sağlayan kurum ve kuruşlar arasındaki sistemden oluşmaktadır. İTU ise güvenli ve sağlıklı gıda ve gıda dışı tarım ürünler sağlayan bir uygulamadır. İTU çevresel açıdan sağlıklı, ekonomik açıdan uygulanabilir ve sosyal açıdan kabul edilebilir olmalıdır. Araştırmanın birincil ve temel materyalini Bafra ilçesinde İTU yapan ve yapmayan çiftçiler ile anket ve mülakat yoluyla elde edilen veriler oluşturmaktadır. Araştırma verileri İTU yapan ve yapmayan 77 çiftçiden toplanmıştır. Verilerin analizinde tanımlayıcı istatistikler ile skorlar hesaplanmış ve uygun istatistiki testler yardımıyla karşılaştırılmıştır. Araştırma sonucunda İTU uygulayan ve uygulamayan çiftçiler arasında bazı sosyo-ekonomik, kişisel ve tarımsal işletme özellikleri açısından farklılıklar belirlenmiştir. Öte yandan, İTU benimseyen çiftçilerin en çok yararlandığı enformasyon kaynakları olarak ilçe tarım müdürlüğü ve elemanları, sebze üreticileri birliği (İTU) danışmanı ve ilaç/gübre bayileri belirlenmiştir. Ancak, araştırma enstitüsü, üniversite ve kooperatifler gibi enformasyon kaynaklarından çok sınırlı yararlanılmıştır. Bu yüzden bu kurumsal kaynakların çiftçileri daha fazla desteklemesi gerekmektedir. Bu çalışma sonucunda TBES teorisi ve metodolojisinin çitçilerin enformasyon sistemlerinin belirlenmesi için yeterli olduğu düşünülmektedir. Çiftçileri destekleyen enformasyon kaynaklarının belirlenmesi bu sistemin temel unsuru olsa da; enformasyon ve yeniliklerin iletişimi, paylaşımı ve ağının belirlenmesi için TBES yaklaşımı yeterli değildir. Gelecekte İTU gibi çevreyi korumaya yönelik ve sınırlı enformasyon desteğinin olduğu karmaşık enformasyon ve bilgi sistemlerinin analizinde sosyal iletişim ağı analizleriyle Tarımsal Bilgi ve Yenilik Sistemi (TBYS) yaklaşımının kullanılması daha uygun olabilecektir.

Anahtar Kelimeler: Tarımsal Bilgi ve Enformasyon Sistemleri (TBES); İyi Tarım Uygulamaları (İTU); Bafra.

1. INTRODUCTION TO THE RESEARCH

1.1 Concept Description

The topic of the study was the Comparison of Agricultural Knowledge and Information Systems (AKIS) for adopters and non-Adopters of Good Agricultural Practices (GAPs) in Bafra District of Samsun, Turkey. Agricultural Knowledge and Information Systems (AKIS) comprise the institutions and organizations that generate and disseminate knowledge and information to support agricultural production, marketing, and post-harvest handling of agricultural products and management of natural resources.

After implemented many projects about the importance of AKIS to farmers conducted by agricultural organizations working in Bafra, the farmers started, how they can benefit from AKIS and as farmers, their role in the AKIS system. Before the AKIS, there were poor communications between farmers and other actors in the AKIS system. However, in recent years, farmers were access to exact information and knowledge and the exact time of getting information and knowledge they needed. The AKIS facilitators help farmers to understand the linkages among the actors who are members of the AKIS system.

Good Agricultural Practices (GAPs) are environmentally sound, economically viable and socially acceptable, and result in safe and healthy food and non-food agricultural products (FAO, 2003). Combination and integration of AKIS and GAPs will be helping the farmers to obtain healthy and good quality food to assure their nutrition and nourishment, generating a value added in their products to access markets in a better way and consumers will enjoy better and safe quality food, with sustainable production.

GAPs are essential for the farmers. Any farmer who adopts these practices can be concerned and aware of the environment, gained more profit and also cares about the health of himself and his family. The GAPs made some modifications in terms of growing crops and their inputs. For instance, GAPs suggest farmers that the use of fertilizers to be the last choice. They brought farmers new ways of protecting plants like using pest-resistant crops, biological control and cultural practices.

GAPs increase the profit and income of farmers. They encourage farm investors to invest the GAPs GAPs help the farmers and their families that they obtain healthy and good quality food to assure their nutrition and nourishment, generating a value added in their products to access markets in a better way.

The importance and benefits of GAPs include improved worker and consumer conditions, enhance the agricultural family welfare, and improve food security. GAPs concern about biodiversity, rational handling of agro-chemical and no contamination of water and soils. GAPs also encourage to the producers, animal welfare, clean field toilets and deposits.

GAPs offer that all workers (farm workers) will be trained, especially in agro-chemicals/fertilizer management, hygiene and first aid. GAPs provide personal protection equipment for the application of agro-chemicals. There should be enough number of fixed or mobile toilets for all workers. Toilets should be kept clean, in good conditions, ventilated and doors should close well.

1.2 Thesis Structure and Chapters

The thesis contains 7 chapters. In chapter one, the concept description about the topic is presented. Importance of GAPs and AKIS were introduced.

In chapter two literature reviews about the Comparison of Agricultural Knowledge and Information Systems (AKIS) for adopters and non-adopters of Good Agricultural Practices (GAPs) in the Bafra district of Samsun, Turkey were discussed. Good Agricultural Practices (GAPs) and its evolving period and why practicing of GAPs system is very critical for the farmers. It was described how different authors defined the word adoption. It will also be discussed GLOBALGAP history, aims and objectives. Finally, current situation of GAPs and previous studies on good agricultural practices in Turkey and the world will be summarized.

In chapter three, the theories and models of AKIS will be described. The definition and meaning of GAPs will also be presented. How actors and stakeholders of GAPs transfer the knowledge of GAPs helped by AKIS will be discussed.

In chapter four the research area and its physical characteristics will be presented. It will be explained briefly the location, climate and population of Bafra district. The crop production status and animal production status of Bafra district will also be presented. It will be explained briefly the Bafra farmers’ knowledge about GAPs.

The materials and methods of the thesis will be discussed in chapter five. The statement of the problem, the aims and objectives of the study that deal with this thesis and the research questions of the study will be presented. The analytical methods of the study will also be discussed. In this chapter, the data collection methods of research, the limitations of the study are also explained.

In chapter six, research findings of the thesis will be explained. The socioeconomic characteristics of farmers will be described. Farming experience, social security (SGK), and organizational membership of farmers will be presented. Ownership and land use status of farmers, livestock and plant products will be analyzed. Farmers’ source of information and knowledge about GAPs are analyzed by using statistical tests.

In the chapter seven, conclusion and recommendations will be presented. The main points and findings of the thesis were presented in the conclusion section. The recommendations of the study were described in the recommendation section. The low sample size and methodological implications of this study were discussed. The language barrier and misconceptions of conventional farmers about GAPs were also discussed. The questionnaire of the study and curriculum vitae were also presented in the Appendices section.

2. GOOD AGRICULTURAL PRACTICES (GAPs)

2.1 Introduction

This chapter discussed the introduction and background of Good Agricultural Practices (GAPs). GAPs and its evolving period and reason for adoption of GAPs system are very critical for the farmers. It is described how different authors defined the word adoption. It will also be discussed GLOBALGAP and its organizational history. Current situation of GAPs and previous studies on GAPs in Turkey and the world will be presented.

2.2 The Concept and Background Information about GAPs

The concept of GAPs ensures the environmental, economic and social sustainability for on-farm production and post-production processes by making agriculture less dependent on chemicals resulting in safe and healthy food and non-food agricultural products.

In recent years, the concept of Good Agricultural Practices (GAPs) has evolved in the context of a rapidly changing and increasingly globalized food economy. GAPs have developed of the concerns of a range of stakeholders committed to food production and security, food safety and quality and the environmental sustainability of agriculture. Used in numerous contexts, the term “GAPs” has different meanings for different stakeholders (FAO, 2003). The FAO defines GAPs as *“practices that addresses environmental, economic and social sustainability of on-farm processes and post-processes and result in a safe and quality food and non-food agricultural products”* (FAO, 2003)

The word “adoption” is defined in different ways by various authors. Loevinsohn *et al.* (2013) defines adoption as the integration of a new technology into existing practice and is usually preceded by a period of ‘trying’ and some degree of adaptation. Adoption is a decision of full use of an innovation as the best course of action available and rejection is a decision not to adopt an innovation (Rögers, 2003). Citing the work of Feder, *et al.* (1990), Bonaban-Wabbi defined adoption as a mental process an individual passes from first hearing about an innovation to final utilization of it.

Adoption is in two categories: rate of adoption and intensity of adoption. The former is the relative speed with which farmers adopt an innovation, has as one of its pillars, the element of ‘time’. On the other hand, intensity of adoption refers to the level of use of a given technology in any time period (Bonaban-Wabbi 2002). GAPs adoption depends on when the switch from the old to new methods offer additional gains either in terms of higher net returns, lower risks or both.

There are a variety of GAPs that can be instituted at the farm level. GAPs programs help farmers' self-audit their operations of producing, processing, and transporting products of plant and animal origin to safeguard food products, the environment, and the people who consume and produce the products. Providing safe foods and promoting safety for humans and the environment include all the steps in the production chain from farm to consumer (URL -1).

Currently, consumer behavior is increasingly driven by factors related to quality, health and safety, particularly for fresh food products (Viaene et al., 2000). Considering this marketing environment, the importance of good agricultural practices become visible in Turkey to solve the current challenges in terms of meeting consumer demands and accessing into the comparative world market (Akkaya and Ozkan, 2000).

The use of GAPs through AKIS will be helping the farmers' access to information and knowledge about the practicing of good tillage, producing safe and high quality food for human and their livestock, and protecting the environment.

2.3 Usefulness of GAPs

GAPs are sets of recommendations that can help improve the quality and safety of the produce grown. These general guidelines can be adapted and/or incorporated into any production system. GAPs focus on four primary components of production and processing: soil, water, hands, and surfaces (URL -2).

Appropriate promotion and adoption of GAPs from farm to fork will help improve the safety and quality of food and agricultural products. In addition, producers and consumers will benefit from global markets and improve their livelihoods and the national economy as a whole. Adoption for GAPs will help promote sustainable agriculture and contribute to meeting national and international environmental and social development objectives. Adherence to food quality and safety will protect people's health – an important factor in national development (URL-3).

2.3.1 How can GAPs promote food safety?

There are many activities that take place as food products move from the farm to the table. These include activities related to production, harvesting, post-harvest operations, packaging, transportation, and storage. Implementing programs such as the use of GAPs and GMP (Good Manufacturing Practices) are important steps in reducing possible hazards associated with the produce throughout the production and distribution chain (URL-3).

"Food safety" is a broader term, which means an assurance that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use. This can be achieved through the utilization of various resources and strategies to ensure that all types of foods are properly stored, prepared and preserved so that they are safe for consumption (WHO, 2001).

Food safety is an obligation of all food sector operators (producers, processors, exporters, importers, etc.) to place on the market wholesome products that;

- Comply with current requirements;
- Do not have a harmful effect on consumer health;
- If defective, can be withdrawn from the market.

The food chain approach to food safety and quality recognizes that the responsibility for the supply of food that is safe, healthy and nutritious is shared along the entire food chain – by all the operators involved in production, processing, trade and consumption of food (URL-3).

Food elaborated with satisfactory hygienic standards is one of the essential conditions for promoting and preserving health, and inadequate control is one of the factors responsible for the occurrence of foodborne disease outbreaks that caused many people to die (Oliveira *et al.* 2003).

Inadequate food safety is a significant contributor to the burden of disease in developing countries. The heavy burden of foodborne diseases imposes substantial economic losses to individual, households, health systems and entire nations. Economic losses as a result of rejected exports due to shortcomings in food safety are also often very significant (FAO/WHO, 2005a).

2.4 What is GLOBALGAP?

The recent focus on liberalized market economies and globalization has brought concerns about food quality and safety, sustainable production practices, workers' welfare and safety all aiming at putting in place good agricultural practices. GLOBALGAP is one of the many standards put in place in response to these consumer concerns (Dolan and Humphrey, 2000).

GLOBALGAP is a pre-farm-gate business to business voluntary standard. It has established itself as a key reference for GAPs that concerns aspects of food safety, environmental protection, workers' health, safety and welfare, and traceability (FoodPLUS and GTZ, 2008) in the global marketplace. The GLOBALGAP standard outlines requirements for GAPs in the phase of primary production where international standards are scarce (Henson and Humphrey, 2009).

Private standards are playing an increasing role in the governance of agriculture and food supply chain (Henson *et al.* 2006). Private standards have become much more important in global agri-food value chains over the last decades, and these standards, can be seen as filling a void in international rules. However, the pre-existence of public regulations could collaborate together with the private standards. This collaboration facilitates the production, safety standard effectively.

Even though standard adoption has become an integral part of international food trade, especially in the developed countries, mainly due to quality concerns, according to the literature, standards can have positive and negative effects. One body of literature suggests that standard could lead to export gains, by modernizing the food supply chains through innovation and upgrading (Swinnen, 2007).

2.4.1 Overview of GLOBALGAP and organizational history

GLOBALGAP is an independent verification system for GAPs as a base for supplier compliance. GLOBALGAP began as EUREPGAP in 1997 as a non-profit organization with an initiative by several European supermarket chains. The effort to initiate GLOBALGAP (then EUREPGAP) came from the UK retailers. There were two different factors that were behind this. First was the general trend of globalization, which UK retailers wished to apply a similar kind of quality assurance scheme that they were employing to domestic producers. Second, the introduction of the Food Safety Act (1990) in UK imposed more liabilities on retailers in terms of food safety through "due diligence" program (Van der Grijp *et al.* 2005). The Euro-Retailer Produce Working Group (EUREP), it was renamed as GLOBALGAP in 2007 as more and more producers and retailers around the globe got connected over time.

According to GLOBALGAP Annual Report 2012, the standards possess a network of 1400 trained inspectors and auditors working for 142 accredited certification bodies certifying 409 agricultural products in 112 countries. However, the worldwide spread of GLOBALGAP is quite uneven. There are countries like Chile, Italy, Kenya, Peru, South Africa, with relatively high coverage of GLOBALGAP. On the other hand, out of the 112 countries with GLOBALGAP membership, there are several countries (e.g. Jamaica, Venezuela, and Indonesia) with only one or few certifications.

Among continents, Europe accounts for the largest portion of GLOBALGAP coverage, 74 percent. The percent shares of Asia, Africa, the Americas, and Oceania are 8 percent, 5 percent, 12 percent, and 1 percent respectively (GLOBALGAP, 2012). Because of its extensive coverage, GLOBALGAP is an appropriate scheme to analyze the impact of private food standards on international trade flows.

The certification of the standard also varies among different agriculture sectors. GLOBALGAP covers 8 percent of livestock suppliers, 22 percent, of aquaculture and majority of GLOBALGAP suppliers are crop growers with the share of 20 percent. Within crops, the most important area is vegetables and fruits have 78% share (GLOBALGAP, 2012). For this reason, in this study examines GAPs related to vegetable farmers in Bafra. Figure 2.1 shows countries who are a member in GLOBALGAP organization.

Figure 2.1. GLOBALGAP is applicable worldwide. Over 110 countries in the 5 continents with certified producers (data 2011) Source: GLOBALGAP Annual Report 2011.

In Vietnam, Giac *et al.* (2006), noted that, although obtaining GLOBALGAP certificate will have a positive impact not only on market access, but environmental and social aspects, smallholder farmers will face various constraints in adoption. These constraints are associated with heavy book keeping, high cost of maintaining field hygiene and sanitation facilities, mistrust among stakeholders in the value chain and lack of rewards for applying of GLOBALGAP. The smallholder farmers need technical or financial support or social recognition to facilitate quick compliance.

In Cost Rica, implementation of GLOBALGAP increased cost of production by about 7.8% of the total cost (Anderson and Somaribas, 2003). The extra cost however was incurred by the exporters (buyers of the products) who catered for cost of training, certification and laboratory analysis. The Investment was made in infrastructure, including housing, toilet facilities and storerooms for machinery and agro-chemicals. Farmers were required to purchase pesticide application gears (clothing) and apply newly recommended herbicide.

Mauz *et al.* (2005) in a study on economic analysis of food safety in Jordan found that exporters complying with the GLOBALGAP standards have increased total cost of exported products by 17%. However, some of them estimated the additional cost to be approximately 50% of the total cost of production. They found that Sanitary and Phytosanitary Standards (SPS) and GLOBALGAP regulations create a bias in favor of large scale farmers. This is simply because complying with these regulations requires high amounts of fixed (investment) cost in terms of suitable infrastructure and operational costs of employing new staff and procuring new materials, among others. This indicated that small scale farmers in order to adopt the standards and regulations of GLOBALGAP, that they need a subsidize from their government.

In addition, several authors conclude that GLOBALGAP certification has positive effects for producers and it provides developing countries with potentially valuable opportunities in the global agri-food market. GLOBALGAP promotes access to high-value export markets and improve farming knowledge and thus increasing price received by farmers (Graffham and MacGregor, 2007; Graffham et al., 2007; Henson *et al*, 2011). According to Jaffee and Henson, (2004) show how Peru exerted efforts to upgrade food safety capacity in line with GLOBALGAP and resultantly could position itself as a globally competitive exporter of fresh and processed asparagus.

As another case, UNCTAD (2007) presents the case of Thailand, Malaysia and Vietnam, which have been historically less reliant on EU markets than some of their international competitors, but they could easily enable them to comply with private standards such as GLOBALGAP.

2.5 Current Situation of GAPs in Turkey and the world

In recent years, the world has reached the point of international trade, as in all areas, in agriculture and food products trade the trade agreement were determined by the rules of the World Trade Organization agreements. The sanitary and Phytosanitary agreement is the "protection of human life and health" for purposes of defining the concept of food security as a principle; countries are going to face (Akdamar, 2004). For this reason, Turkey and other member countries must fulfill these standards in terms of both imports and their people. In this situation, as it necessitates the implementation of environmentally friendly systems, our country should produce by using organic farming, GAPs and sustainable agricultural production (Önen and Kara, 2008). The Turkish cities like Antalya, Afyon and Samsun were the cities that conducted research about GAPs.

Bayramoğlu *et al.* (2010), examined the impact of GLOBALGAP requirements on farm income from greenhouse tomatoes in Turkey. They analyzed the difference between the income level of certified and non-certified producers of GLOBALGAP. The survey, conducted in the province of Antalya between 16 certified producers and 33 non-certified producers of greenhouse tomatoes. As a result of the research, the income level of GLOBALGAP certified producer was more than 2.8 times than uncertified producers according to per unit area. Finally, they found that there were important differences between input use of certified and non-certified producers.

According to (Demirbaş and Tosun, 2006), in Turkey, some structural problems of agriculture might hinder the applications of GAPs, IPM (Integrated Pest Management) and ecological production systems, which intend to supply quality and safe raw material to the food industry. In order to overcome these restrictions, the problems which occur during the application of the law should be solved. Other precautions are related to the identification of trained and educated experts and to the education and information of the producers. Some of the other precautions are the promotions of produces' organizations, preventing the farms from dividing and establishing large-sized farms.

According to the GAPs implementation in Turkey, IPM forming the basic GAPs has been carried out in Turkish fresh fruit and vegetable productions for many years.

After 1990's (Integrated Crop Management) ICM approach was put into practice due to mainly the demand of exporters. However, since there was not any certification for products produced fulfilling ICM requirements, producers did not obtain premium prices for their products (Akkaya and Özkan, 2000).

System of production for sale at every stage of the process to define and control the risk to food safety based on the aims to establish basic hygienic principles. To achieve this goal, the basic principles of food safety system based on Hazard

Analysis at Critical Control Points at all stages of manufacturing (HACCP), it is aimed to eliminate the risk of microbiological (mold, bacteria, etc.), chemical (drug residues, heavy metals, etc.) and physical (glass, metal, hair, etc.) (Akdamar, 2004; İçel, 2007).

GAPs approach sets out advice on safe and healthy food and non-food agricultural products from farm production and post production, apply existing knowledge of environmental, economic and social aspects of sustainability (İçel, 2007).

The Center for Disease Control and Prevention (CDC) of the United States report from 2011 estimates that each year, 48 million people become sick from a foodborne disease, 128,800 are hospitalized, and 3,000 die. Only 9.4 million cases are from known pathogens and the other 38.4 million are unspecified agents (Lutter, 2011). This information shows that there is always room for improvement in the area of food safety, agricultural production, and GAPs.

As FOA said in 2003, world agriculture in the twenty-first century is faced with three main challenges: 1) to improve food security, rural livelihoods and income; 2) to satisfy the increasing and diversified demands for safe food and other products; 3) to conserve and protect natural resources. These challenges can be tackled in part through a GAPs approach – a means to concretely contribute to environmental, economic and social sustainability of on-farm production resulting in safe and healthy food and non-food agricultural products.

The role of FOA for good agricultural practices is a collection of principles to apply for on-farm production and post-production process, resulting in safe and healthy food and non-food agricultural products, while taking into account economic, social and environmental sustainability (FAO, 2003).

There are 2 GAPs standards in Thailand; one belongs to Ministry of Agriculture and Cooperatives (Thai Q GAPs), and the other belongs to Thai Chamber of Commerce (THAIGAPs). Western GAPs guideline (EUREPGAP), has renamed to THAIGAP. Platforms of the two standards are mainly similar under food safety, quality, worker health and welfare, and environment. However, traceability is strongly concerned for THAIGAPs private standard with QR code. The development of group certification and quality management system must include service providers, technical knowledge and training. The most significant factor for 2 GAPs standards' adoption is actually the sustainability of market or buyers (who require standard). Certification cost is a burden for smallholdeer farmer, therefore, it is recommended to evaluate risk and seek professional assistance for quality and food safety control (Depatrment of Agriculture, 2015).

In recent years, the production of beef products in Thailand is increasing and the rate of beef product consumption in Thailand and foreign countries has also increased (Suppadit *et al.* 2002). However, it was found out that the quality of domestic beef is below the standard (Ratana, 2004). This is due to the problem on the efficiency of production from beef cattle - raising farmers' lack knowledge and understanding of correct beef cattle raising. Inadequate technology and extension also result in poor efficiency in beef cattle – raising (Suppadit *et al.* 2003). Thus, the Department of Livestock Development has accelerated its program to raise its standard on GAPs for beef cattle farming in 2005. GAPs for beef cattle farming were used to increase their production of beef cattle with good quality beef, worthwhile for investment, good production process for safety, utmost utilization of existing resources, sustainable beef cattle production, and non-polluted environment.

2.6 Previous studies on GAPs in Turkey and the world

There are previous studies on gaps that were conducted in different countries on different continents. Often environmental problems confronting mankind in the last century have revealed the necessity of protecting the earth as a whole. Only locally common and past environmental problems have become global. For this reason, the spread of good agricultural and environmental awareness is intended to prevent problems from arising especially from agriculture. In this context, GAPs prevent the unnecessary use of agricultural chemicals such as pesticides and synthetic fertilizers in the long run, and encouraging adopting sustainable and environmentally compatible agriculture ((Duman and Sarı, 2004).

According to (İçel, 2007), in Turkey, the area of fruit and vegetable production would benefit from the speed of improvements to be provided by GAPs. For this reason, it stated that the reputation of the products tradable both domestically and abroad will be increased by GAPs. With these improvements, the country enables increasing exports of fruits and vegetables at the same able to increase its share in the market. If the country didn’t follow the principles of GAPs it can faces a series of competitive market in the European Union (EU) and the world agricultural production and exports.

The research conducted by Mencet (2005), about The Impact of the use of GLOBALGAP standards on Fruit and Vegetables that Exported to European Union. He analyzed the use of GLOBALGAP standards increased the fruits and vegetables exports to the EU. SWOT analyze was evaluated the positive and negative side, risks and opportunities of the research.

In Turkey, (Delice and Delice, 2005), conducted research on the standard of evaluation and harmonization of the framework of GAPs. They analyzed by using secondary data from various studies that enlighten of the GAPs in the EU and Turkey policies and practices that are performed with regulations associated with the standards and revelant legistlation and found that the standard of GAPs, environmental and food-borne disease problem in the EU is the increase of a priority target, that also located within the framework of agricultural policies in EU harmonization process in Turkey, where, however, in our country, the majority of agricultural land were fragmented farm land, poor practices, lack of effective farmer organizations, low demand for the domestic (local) market and poor training and low educational level of farmers existed.

In Kenya, farmers were operating to international quality and safety standards for last years. Export-bound produce was being sold through informal networks of brokers, traders and resellers who had a limited understanding of international standards. From the first of January, 2005, farmers who export horticultural produce to the European Union were required to comply with the GLOBALGAP regulations including a sophisticated set of GAPs. These requirements cover among other agro-chemical use, record-keeping, farm infrastructure, hygiene facilitates and grading and packing process (New, 2005).

In the United States, (Reyes and Evans, 2008) conducted research on overview of the concept of GAPs and highlights some the potential consequences of not instituting GAPs guidelines into farm operations. GAPs guidelines are necessary for all agricultural operations. Self-audits should be conducted on a regular basis to determine whether a farm meets individual and government GAPs standards. Food safety programs should be instituted to prevent food borne illnesses and food contamination throughout the whole production process from farm to consumers.

In Peru, (Kleinwechter and Grethe, 2006) studied the adoption of the GLOBALGAP standard in mango exporters in Piura, Peru. They have shown that the first major barrier to adoption is linked to accessing information about the standard. Since exporting enterprises were the most informed actors, the adoption of the standard is mostly found in their activities through vertical integration. According to the results, small-scale producers did not comply with GLOBALGAP certification. The implication of this study showed that there were constraints on information access about the adaptation and performance of GAPs principles and regulation.

3. LITERATURE REVIEW

3.1 Introduction

This chapter presents the background information about models and theories of Agricultural knowledge and information system. It is concerned with the agricultural information system (AIS), agricultural knowledge system (AKS), and agricultural knowledge and information systems (AKIS).

3.2 Models

According to Spedding (1988), models are generally the representations of real things, simplified for clear purpose what is essential and what is not. They emphasize the key point of the thing and eliminate the complexities and details which do not seem so important (Garforth, 1996; Demiyürek, 2000).

There are two different, but related categories of models:

- The abstract model: used for analyzing or explaining the main features of systems such as diagrams or maps,
- The concrete model: provided for system construction, as a simple real world analogy (Fenton and Hill, 1993; Demiyürek, 2000).

3.3 System: is a group of interacting components, operating together for common purpose (Spedding, 1988) and separated from its environment by a boundary (Haverkort and Engle, 1986; Demiyürek, 2000). Figure 3.1 shows a model of simple system.

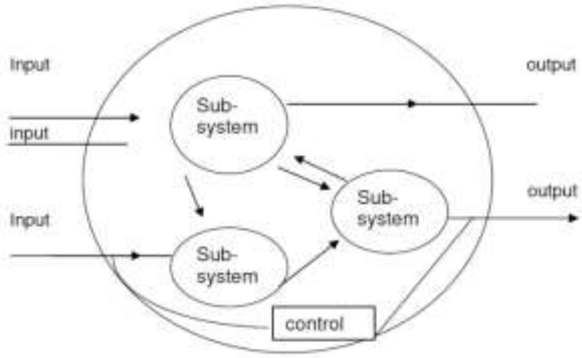


Figure 3.1. A model of simple system (Demiryürek, 2000)

3.4 Social System

A community of people who are aware of their own memberships and accept this (Chekland, 1981) and a community of people who try to continue this group to get support in reaching common aims (Ortiz, 1997). Communication is one of the most important interaction ways in social systems (Looms, 1962; Demiryürek, 2000).

Communication is a way of conveying of information, decisions and instructions which affect the construction of knowledge, ideas and behaviors of human beings. Simply communication is exchanging of information among people (Demiryürek, 2000).

3.5 Data, Information, Knowledge and Wisdom

Before defining and describing Agricultural Information System (AIS), it is necessary to distinguish between the related concepts of “data”, “information” and “knowledge”. The terms information and knowledge are often synonymous, but arguable often incorrectly, used in everyday speech. They are certainly related, but can be given distinct meanings to differentiate between information and knowledge. There are, however, no generally accepted definitions for data, information, and knowledge (Demiyürek, 2000). There is a hierarchy that is used to contextualize data, information, knowledge, and sometimes wisdom, with respect to one another and to identify and describe the processes involved in the transformation of an entity at a lower level in the hierarchy (e.g. data) to an entity at a higher level in the hierarchy (e.g. information). The implicit assumption is that data can be used to create the information; information can be used to create knowledge, and knowledge can be used to create wisdom (Rowley, 2006).

Data

Data can be defined as raw facts that can be shaped and formed to create information (Laudon and Laudon, 1991). Data refer to the “factual invariances” or “the great mass of facts”. The characteristics of data, on the other hand, are that they can be collected by observation or records about facts or events. In addition, data can be interpreted by human or automatic means such as computers. When are processed, they become information. Thus, data are facts taken to be invariant which can be, but have not yet been, processed. The process yields information (Checkland and

Holwell, 1998). However, data do not necessarily lead to information (Röling, 1988; Demiryürek, 2000).

Data are raw (unprocessed) facts and materials which can be observed, interpreted and recorded by humans or electronic equipments. Processed data can be transformed into information (Demiryürek, 2000).

Overall, the data refer to raw facts or raw materials that can be observed, interpreted and recorded by human and electronic devices. They are the starting points in people's mental processes. The processing of data leads to information, though this is not always the case, nor the same information, because processing is an individual attribute, sometimes modified by social contact (Demiryürek, 2000).

Information

Information refers to 'processed selected data' (Demiryürek, 2000). Another definition from Ackoff (1989), states the information is contained in descriptions, answers to questions that begin with such words as who, what, when and how many. Information systems generate, store, retrieve and process data. Information is inferred from the data. The word information emphasized by Checkland and Holwell (1998), that the important function of 'context' and 'interest' in attributing meaning or the conversion (from data to information) process. That is to say 'structured data have contextual meaning'. They point out that this process is uniquely human. Information users have own memory, knowledge and values, and people perceive the 'real' world through their 'cognitive filers' (Land, 1985) by which they select, accept, reject, or distort (mislead) messages or information. Thus, even simple information may be interpreted differently by different people (Checkland and Holwell, 1998).

Information can be processed, generated transformed and shared, through complex processes of coding and decoding, generally known s communication. The communication of information is a major concern for Extension Services (Demiryürek, 2000).

Knowledge

Knowledge is the product of processing information, but information does not necessarily lead to knowledge (Roling, 1988). Knowledge is the product of processing information, and is at a high level of structure and longer lasting. Knowledge is in a person's mind and results from the functioning of the brain. Concepts, meanings and intellectual skills constitute a person's knowledge which can be developed through formal and informal learning experiences (Demiyürek, 2000).

There are two kinds of knowledge acquisition, namely description and acquaintance noted by Russell (1948). The former is learning in a passive mode such as reading a book (mastering abstract information). The latter is learning by doing: the kind of skill training that comes from practicing. This is a concrete knowledge acquisition, oriented to problem solving.

The difference between knowledge and information is evidently that information can be transmitted whilst knowledge is an inherent property of the brain. Thus, a person can generate knowledge and utilize it, but not transfer it (Röling, 1988), except again as information withdrawn from the memory of the other electronic store (Rolls, 1986; Demiyürek, 2000).

Wisdom

Wisdom is the ability to increase effectiveness. Wisdom adds value, which requires the mental functions that we call judgement. The ethical and aesthetic values that this implies, are inherent to the actor and are unique and personal (Ackoff, 1989).

Arguably the most significant observation is that only three of the books seek to define wisdom, despite its position at the pinnacle of the wisdom hierarchy. Such an omission might lead to a deduction that many authors in information systems and knowledge management view wisdom as being beyond their remit for some reason. It might be argued that they do not see information and knowledge as contributing to wisdom, or indeed of being capable of being interpreted into wisdom (Rowley, 2006). On the other hand, they may agree with Jashapara (2005) when he suggests that wisdom is a very elusive concept. It perhaps has more to do with human intuition, understanding, interpretation and actions, than with systems. He raises the matter of ethics: “Wisdom is the ability to act critically and practically in any given situation. It is based on ethical judgement related to an individual’s belief system”.

Several authors who do mention wisdom recognize the importance of wisdom, and the importance of contextualizing information and knowledge management with reference to wisdom (Rowley, 2006). Jessup and Valacich, (2003) sees wisdom as accumulated knowledge, which allows you to understand how to apply concepts from one domain to new situations or problems. In the knowledge management literature, Awad and Ghaziri, (2004) suggest that “Wisdom is the highest level of abstraction, with visionary foresight and the ability to beyond the horizon”.

In addition, wisdom is a neglected concept in the knowledge management and information systems literature. If the purpose of information systems and knowledge management initiatives is to provide a basis for appropriate individual and organizational actions and behavior more researchers and practitioners need to engage with the debate about the nature of individual and organizational wisdom.

In short, the terms of data, information, knowledge and wisdom are connected to each other. Ackoff (1989), posited a hierarchy at the top of which lay wisdom, and below that understanding, knowledge, information and data, in that order. Furthermore, he wrote that “each of these includes the categories that fall below it,” and estimated that “on average about forty percent of the human mind consists of data, thirty percent information, twenty percent knowledge, ten percent understanding, and virtually no wisdom”. This phraseology allows us to view his model as a pyramid, and indeed it has been linked to one ever since (Rowley, 2007; see figure 3.2). “Understanding is omitted, since subsequent formulations have not picked up on it.)

Figure 3.2. The Data-Information-Knowledge-Wisdom hierarchy as a pyramid (Ackoff 1989; Rowley, 2007)

3.6 Transfer of Technology (TOT) Model

Before we explore the meaning of Transfer of Technology (TOT), it is important to understand first what technology is. Technology can be defined as products, processes, or related findings that are tangible, reproducible and scientific or technical in nature. Technology can also be defined as "information required producing and selling a product or service." With this understanding we can now define what TOT is. Khurana (2013), defined Transfer of Technology as the process of disseminating technology (including knowledge and skills) from the giver to the recipient. Other scholars defined TT as the process by which technology or knowledge developed in one place or for one purpose is applied and exploited in another place or for some other purpose.

TOT had been dominantly applied to many countries' agriculture (Chambers, 1983; Demiryürek, 2000). In the TOT model, the role of components can be broadly defined as generation for research, transfer for extension, and adoption for farmer (Demiryürek, 2000).

In spite of this paradigm has been widely used throughout the world, experiences show that it is only partially adequate. The model seems to be more fitted to the conditions and needs of resource rich farmers (RRFs) (Chambers, 1983; Chambers and Ghildyad, 1985) or progressive farmers (Röling, 1988) than resource poor farmers (RPFs). This is because the conditions of research institutes often resemble those of RRFs (Chambers and Ghildyad, 1985). Among the criticisms directed at TOT, the model assumes a one-way, linear transfer of technology, and that technology generation begins at research institutes (or at international research centers) and ends with the farmer who is expected to respond by adopting. Furthermore, it reflects an inadequate understanding of the concept of knowledge and information systems (Roling, 1988 and 1990; Demiryürek, 2000). The TOT model can be illustrated as follows:

Figure 3.3. Transfer of Technology (TT) Model (Demiryürek, 2000)

The following can be considered as among the critics against the TOT model:

- Top-down approach
- It is one way model
- Considers linear technology transfer
- Technological development start in local research institutes or international research centers and the farmers are expected to adopt that technology sooner or later.

3.7 Agricultural Information System (AIS)

The Agricultural Information System can be defined as: *"a system in which agricultural information is generated, transformed, transferred, consolidated, received, and fed back in such a manner that these processes function synergistically to underpin knowledge utilization by agricultural producers"* (Roling, 1988).

AIS can be applied to any specific farming system in order to analyze, measure the performance of, and how, the information system works. Research, for example, is not the only source of information and technology; farmers also generate their own information, knowledge (indigenous) and technology. In the same way, research may be the user of farmers' information and techniques in order to modify and develop technology (Roling, 1990; Rolls *et al.* 1994: Demiryürek 2000).

This approach is also useful to define possible defaults and improve the coordination between components. This leads to the notion of information management (Engle, 1989; Röling, 1990). Participation of all components is essential for the system to work synergetically. In addition, the exchange of information through networks among components is critically important for successful technology generation and transfer (Engel, 1989; Rolls, 1990; Röling, 1990; Röling, and Engel, 1991/a and b; Rolls *et al.* 1994). A simple model of AIS can be illustrated as follows:

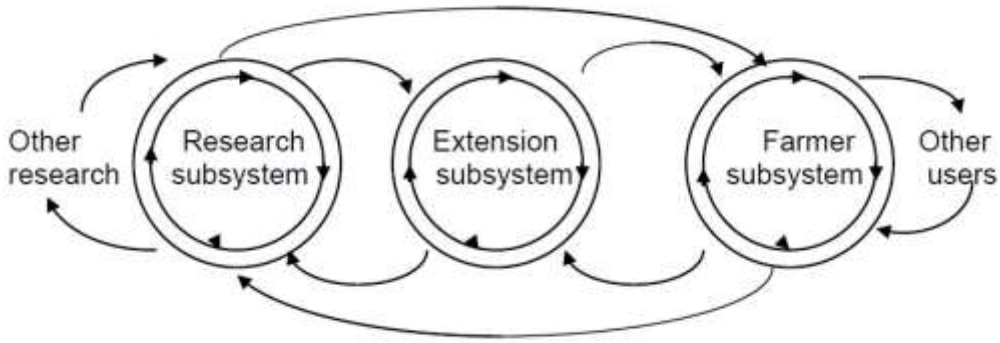


Figure 3.4. The Agricultural Information System (AIS) Source: Adopted from Havelock (1986); Roling (1988) and (1990); Demiryürek (2000)

3.7.1 Sources and types of information received by farmers

The Information source is an institution or individual that creates or brings about a message. The characteristics of a good information source are timelessness, accuracy, relevance, cost effectiveness, trustworthiness, usability, exhaustiveness and aggregation level (Statrasts, 2004). The selection of an information source depends on a number of factors; including level of income, farm size, age, geographical location, level of education (Riesenberg and Gor, 1999). A Survey made by Adhiguru *et al.* (2009) found that small and marginal farmers accessed less information and from fewer sources than medium and large scale farmers.

Agricultural information can be seen as an important factor which interacts the other production factors such as land, labor, capital and managerial ability. The productivity of these other factors can arguably be improved by the relevant, reliable and useful information and knowledge. Hence, the information supply from extension, research, education and others has become managed by agricultural organizations, and especially disseminated to farmers so that they can make better decisions to take advantage of market opportunities and to manage continuous changes in their production systems. Therefore, there is a need to understand the functioning of the particular agricultural information systems in order to manage and improve them (Demiryürek, 2008).

The study by Opara (2008) examined the sources of agricultural information available to farmers in Imo State, Nigeria as well as the farmers' preferred sources. The results mentioned that88.1 percent of the farmers indicated agricultural extension agents as their source of information, 71.2 percent indicated fellow farmers, 63.2 percent indicated radio, 43.3 percent indicated television, etc. The results further showed that the majority (70.0 percent) preferred the extension agent to the other media (radio 28.4 percent, friends and relatives 27.2 percent, television 19.1 percent, etc.). The results emphasize the need for the extension agency to regularly identify those sources of information that farmers prefer, or use most, as this will enable them deliver agricultural information effectively to the farmers.

The study conducted by Rees *et al.* (2000) summarizes the various and varied sources of information quoted by farmers. Community Based Organization and traders, in the sub-location feedback meetings, friends, relatives, neighbors, women's groups and school/youth groups were reported as major sources. Other organizations such as farmer cooperatives were also mentioned as a significant source. Traders and markets were also mentioned as important sources. Most of the farmers considered the ministry of agriculture as a major source of information and most also reported getting agricultural information from barazas (local meetings called by the area chiefs – appointees of the office of the president). Government extension staff was mentioned as important information sources by half to three-quarters of respondents, and neighbors and relatives were listed as amongst the most important sources.

The findings of Ozowa (1995) indicate that the information needs may be grouped into five headings: agricultural inputs; extension education; agricultural technology; agricultural credit; and marketing. Modern farm inputs are needed to raise small farm productivity. These inputs may include fertilizers, improved variety of seeds and seedlings, feeds, plant protection chemicals, agricultural machinery, and equipment and water.

Bachhav (2012) stated that, the use of information in agriculture sector is enhancing farming productivity in a number of ways. Providing information on weather trends, best practice in farming, timely access to market information helps farmer make correct decisions about what crops to plant and where to sell their product and buy inputs. According to Richardson *et al.* (1998) the information needs of farmers change from time to time due to changing agricultural technologies, environmental changes, agricultural policies, and the emergence of agricultural innovations.

3.7.2 Agricultural Knowledge and Information Systems (AKIS)

Agricultural knowledge and information systems can be described as *" a set of agricultural organizations and/or persons, and the links and interactions between them, engaged in the generation, transformation, transmission, storage, retrieval, integration, diffusion and utilization of knowledge and information, with the purpose of working synergistically to support decision making, problem solving and innovation in agriculture"* (Röling and Engel, 1991)**.** Agricultural Knowledge and Information Systems theory developed from the system theory. This agricultural knowledge and information exchange is similar to an approach which provides communication.

Information and knowledge are regarded as essential for farmers to respond successfully to the opportunities and challenges of the physical, social and policy environments in which they operate (McQuail, 1983). It has been said that empowering the poor is about providing them with information. Knowledge gaps and information problems are key constraints to the efficient functioning of markets and equitable growth and development (Garforth *et al.* 2003).

Technology refers to the combination of knowledge, inputs and management practices which are used together with productive resources to gain a desired output. Transfer of technology is not merely the means of transferring knowledge, information and skills about technology to its potential users, but also a way of helping them to use these technologies fruitfully to their advantage. This study used the conceptual framework shown in Figure 3.5 below.

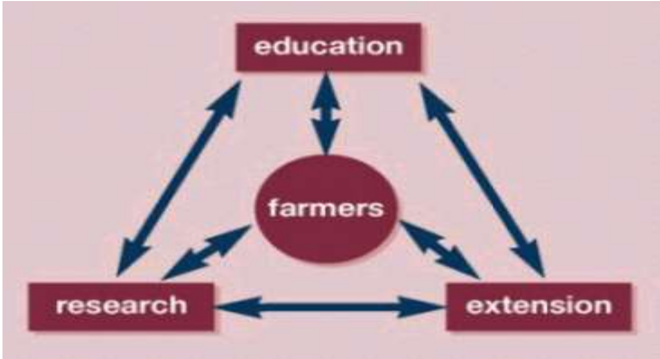


Figure 3.5. An overview of the conceptual framework of AKIS
Source: FAO and World Bank (2000)

3.7.3 Agricultural Knowledge and Innovation System (AKIS)

A comprehensive review of innovation theories would be outside the scope of this thesis. Instead, a selection of AKIS for information and their relevancy within the agricultural development process will be examined closer. Government-driven agricultural knowledge systems, or AKS for short, historically, have been organized linearly around the transfer of knowledge from scientists to farmers by means of state sponsored extension workers. Research, education, extension, and support systems, thus comprised of the most important subsystems of the Agricultural Knowledge System (AKS) (Leeuwis and Van den Ban, 2004). Since that time the linear model of innovation has been challenged by a model in which knowledge and innovations are co-produced by "*a network of organizations, enterprises and individuals focused on bringing new products, processes or new forms of organization into economic use, together with the institutions and policies that affect the way agents interact, share, access exchange and use knowledge"* (Hall, 2006).

This definition of an innovation system signifies a transition of the traditional AKS into a more open, inclusive and coordinated system, the Agricultural Knowledge and Innovation System or AKIS that includes rural (micro) entrepreneurs such as farmers and others, as well as consultants, policy makers, supplier and processing industries, retail outlets, customers, NGOs and financial service providers in the innovation process (Knickel *et al.,* 2009). The illustration below shows the model of AKIS.

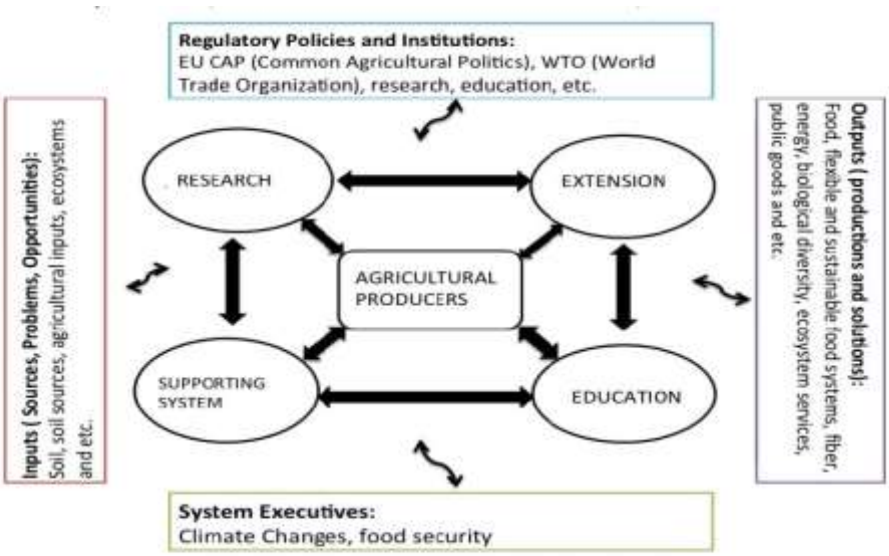


Figure 3.6. Agricultural Knowledge and Innovation System (AKIS)
(Rivera *et al.* 2005)

3.8 Previous researches related to AKIS conducted in Turkey and the world

An agricultural knowledge and information systems (AKIS) is a network made up of organizations and people who are linked by commercial, professional or social relationships (Röling 1988). Such a network may consist of producers, researchers, consultants and extension professionals with a common interest in a particular production technology.

Demiryürek (2000) used agricultural information system theory to analyze the current information systems used by organic and non-organic hazelnut producers and found that the information systems for the two groups of farmers were largely separate. The conversion to organic production clearly demanded changes in the information system to allow producers to acquire the appropriate new knowledge and skills. The organic producers had used more information sources more frequently and more active than non-organic producers.

The study conducted by Rees *et al.* (2000), on agricultural knowledge and information system (AKIS) undertaken by the Keny summarizes the types of information obtained by farmers. It was mentioned that technical information was reportedly received by 16-13 percent of farmers. However,most end users felt that information transfer for this category was particularly deficient; the major knowledge gap expressed in the feedback meetings in all four districts was for technical information (e.g. how to manage late blight in potatoes, where to get certified seed, the most appropriated varieties for a given location, housing and management of livestock, etc.). Other information types it mentioned are marketing information and operational information.

Naidoo and Rolls (2000) examined agricultural information used by small-scale cattle farmers in Mauritius and found that the farmers managed information as a production resource. The personal characteristics and cattle husbandry practices of the farmers were major influences on their management of information. The practices were mainly learnt from family elders. Extension advice was only partly remembered, or ejected as the information from this source was sometimes not useful.

Rolls and Slavik (2003) investigated changes in information systems in Czech agriculture over time. The actual sources of information were changed, although about half remained the same. Printed media remained most important, social sources decreased in importance, and professional sources such as consultants, research and university sources, increased. The horizontal transfer of information between similar farms remained very important. The researchers suggested that new information sources related to agriculture are needed and the predicted that computerized databases will be increasingly used in the future.

Maningas *et al.* (2005) found that information within the hands of the farmers means empowerment through control over their resources and decision-making processes. They note that being an effective and efficient delivery system of essential information and technology services facilitates the clients' critical role in decision-making towards improved agricultural production, processing, trading, and marketing. Farmers also their decision-making depends on the amount of information they have when it comes to the food safety and environmental protection.

Hoang *et al.* (2006) explores how social networks function as assets for people and households in the rural areas of developing countries and influence the access to information and the benefits of research and development. They presented a case study of such networks in a village of Northern Vietnam and provided evidence of the need for the efficient delivery of extension services and research and development interventions at micro level.

The study by Daudu *et al*. (2013) in Nigeria further showed that the main sources of information used by farmers in accessing agricultural information were extension agents, friends, radio and libraries. Similarly, Boz and Ozcatalbas (2010) revealed that family members, neighbor farmer, extension services, input providers and mass media were key sources of information for Turkish farmers.

Mtega and Benard (2013) carried out the study on the state of rural information and communication services in Tanzania. The findings from the referred study show that, poor/unreliable information infrastructure, high illiteracy levels, low income, lack of electricity and high cost of Information and Communication Technologies (ICTs) have limited the accessibility of information services in rural areas.

Ogboma (2010), Meitei and Devi (2009) and Mtega and Bernard (2013) mentions some information sources used by farmers in accessing their agricultural information including newspapers, journals, bulletins, community leaders, and farmer groups. Another study by Daudu e*t al.* (2009) reported farmers to use agricultural extension staff, posters, televisions, and radio as their source of their information.

In this study, the AKIS especially Agricultural Information System (AIS) was used to analyze the main sources of adopters and non-adopters of GAPs. The actors in the AKIS system who have a direct contact with the adopters of GAPs were presented. The main actors in the system were district agricultural manager/personnel, union adviser of the farmers' association (GAPs) and fertilizer/pesticide dealers. The aim AKIS system was used to analyze this study was to connect adopters of GAPs and other actors like research institute, extension agent, university (faculty of agriculture), cooperatives and etc. AKIS system can connect many actors to adopters of GAPs in order to exchange information that was more valuable to them. AKIS system was also organized way actors share, convey and communicate the information.

4. RESEARCH AREA

4.1 Introduction

This chapter presented the research area and its physical characteristics. It will be explained briefly the location, climate and population of Bafra district. The crop production status and animal production status of Bafra district will be presented. The reason that selected Bafra district as research area was because of the high number of adopters of GAPs that live in it. The numbers of adopters of GAPs that live in other districts in the province were less. It will be described the Turkish government policy about GAPs, GAPs supports and regulations, and Vegetable Farmers' Union in Bafra. Vegetable Farmer's Union in Bafra is association encourages its members to produce their vegetables under GAPs.

4.2 Location

Bafra district is located in the northern part of Samsun province. It shares a boundary with the Alacam to the west, Black sea to the north, East Samsun, Vezirkopru, to the south-west, Havza to the south and Kavak to the southeast. The surface area of Bafra is 175,000 hectares. Bafra Plain is one of the well-known places.

It is about 40 km long and flat form and 20 km deep. It is the largest lowland plain of the black sea region. Kızılırmak river delta covering the Bafra plain is surrounded by mountains in the south. The highest place is Nebiyan Mountain and it is 1224 m. These mountains are extensions of Canik Mountains. Bafra plain formed by Kızılırmak effects. Many lakes were formed in parts of the river close to the sea. There is also foothills plateau of Nebiyan Mountain. Kızılırmak River is 1151 km long. There are lakes formed where Kızılırmak River flows into the sea. They are located on both sides of the river. Karaboğaz Lake, located the west side and lakes for fishing located east side. The east side lakes include Dutdibi, Liman, Hayırlı, Çernek, Uzungöl, Tombul Lake and İnce Lake. There are reeds and marsh near the lakes. However, there are also forests (URL-4).

Figure 4.1. Map of Turkey showing the Bafra district in Samsun Province. (Source: http://www.istanbul-rehber.com/harita/il/samsun-haritasi.asp)

4.3 Climate

Winds prevailing in the district generally vary according to the seasons. In summer, high pressure occurs in the Black Sea region while a low pressure occurs in Central Anatolia. Thus the Black Sea towards to the center the anticyclone winds prevail, and they are North-East and North-West winds. In winter, it is under the influence of temporary low pressure at the center of the district. Southwest in the district, dry and hot winds blowing from southern direction, they reduce the moisture in the district. The district average humidity is 73%. Especially in April and May, this figure reaches 77-79% average. In December, humidity falls to 70%. The district average absolute humidity is 5.0 grams a year. Absolute humidity is directly proportional to the temperature in the summer and it is the highest level. The district maximum rainfall is in November, and the least precipitation falls in May. Thus, the average annual rainfall is 700 mm and the average number of rainy days per year is 100 days (URL-4).

4.4 Population

The district contains a total of 5 sub-municipalities such as the Center of the district, Cetinkaya, Doğanca, İkizpınar and Kolay. The district also has 115 village headmen. The district, to the address based population registration system in 2010 and according to the final figures, 86, 569 live in the Center of the district, 76, 355 live in sub-districts and villages and a total of 144, 465 live in Bafra district. While the majority of the population is young people, according to the Ministry of National Education, 13, 434 boys and 13, 187 girls are studying formal and non-formal education. The district has a total of 26, 621 students and 104 schools. High school and the Faculty of Education of the district have received 2, 643 boys and 3, 935 girls. Master students of 146 men and 85 women also study, the Faculty of Education. Bafra district conducts Watermelon Festival in August each year to promote and encourage watermelon producers to achieve better product (URL-4).

4.5 Crop Production Status in Bafra

Because of Bafra land is plain and good for agriculture the inhabitants are predominantly farmers cultivating mostly wheat, maize, tobacco sugar beet and rice. Tobacco is the main cash crop. In general, Samsun province produces 422, 234 tons of wheat, 168, 100 tons of wheat from the total number produced by Bafra farmers. The Samsun rice production area includes Bafra plain is of 8,645 ha of which is 68% (5900 ha). Samsun tobacco production in 2003 was 14,556 tonnes that produced from cultivated of 15, 872 hectares and 8,124 tonnes that are part of the Samsun tobacco production cultivated from Bafra plain and it is 8,685 hectares (URL-6). Also, according to data from the 2003 Samsun province vegetable production area is 40,865 hectares and the production was 1, 189,322 tonnes. Bafra plain produced 472,806 tonnes of vegetable production area from cultivation of 16,510 hectares, which accounts for 40% of vegetable production of Samsun province and it is also produced 17,466 tonnes of fruit (URL-5).

According to the data in the table of the total agricultural area of approximately 9% in Bafra district it is allowed to stay idle or fallow. Field crops are cultivated more areas compared to other crops. Field crops cultivated in the summer (11.07%) and vegetables are grown in winter is (10.30%). Table 4.1 below shows the distribution of agricultural land in Bafra district.

Table 4.1. Distribution of agricultural land in Bafra district

Products	Hectare (ha)	Percentage (%)
Field crops	42,935	63.34
Summer crops	7,503	11.07
Winter vegetables	6,980	10.30
Hazelnut	1,500	2.21
Fruit covered area	3,200	4.72
Fallow land	5,669	8.36
Total Agricultural Land	67,787	100%

Source: GÜFBED, 2012

4.6 Animal Production Status in Bafra

According to 2014 data of Ministry of Food, Agriculture and Livestock; Cows are 33,5000, veal-calves are 12,500, and buffalos are 4,000 in number and Total, 50,000 cattle are kept in Bafra district. It is also keeping 2,700 sheep and 25,000 goats. 450,000 laying hens, 15,000 broiler chickens, 6,500 turkeys, 2000 ducks, 2,000 gees and other poultry of 2,500. In total 728, 000 poultry is also keeping in Bafra district. There are also almost 43 business beekeepers in Bafra district, but the number of apiculture is 38 (Bafra GTH İlçe Müdürlüğü, 2014).

4.7 Turkish Government Policy about GAPs

During the 1990s the purpose of agricultural policy in Turkey was feeding the people and increasing the production. Intensification and increasing of the production was the first target.

According to Ayyıldız (1992), the main objectives of agricultural policy in Turkey in the 1990s were ordered in the following ways:

- Feeding the people and related purposes,
- The supply of raw materials and other industrial sectors,
- Foreign trade and related purposes,
- Income policy and related purposes,
- To abide by the objectives of the common agricultural policy of the European Economic Committee (EEC) agricultural policy,
- The balance of flow of goods in the markets and ensuring price stability.

As we can see the above-mentioned objectives, the protection of environment, sustainable agriculture, food safety, animal health and welfare purpose did not include to the policy objectives. This situation was not exclusive to our country, but many of the countries in the world demonstrate with the same goals and objectives of agricultural policy in that period. In addition to a change in breeding and production techniques, changes in consumer demand and developments in the international arena to the EU and the World Trade Organization (WTO) also induced to change the past objectives and goals of agricultural policy in Turkey. As a result of this agricultural and ecologically sustainable use of resources, raising that standard of life in rural areas, the demand from domestic and foreign markets toward the production of reliable quality food also caused to make modifications the past agricultural policy in Turkey. In 2006, the publication of agriculture Law No. 5488 was intended to be included in these new agricultural goals and policies (URL – 6).

In accordance with this change, primary production should be organic farming and good agricultural practices, processed agricultural production under the guidance of ISO 9000 of quality management systems, HACCP and ISO 22000 for food management systems applications has been on the agenda of the country (URL – 6).

The certification of production under good agricultural practices began with EurepGAP (GLOBALGAP) protocol. Since 2003, the European fresh fruit and vegetable exports to countries in the sector, GAPs are carried out according to the criteria of GLOBALGAP. In 2004, the number of Turkish farmers under certified GLOBALGAP producers was 102. However, over the years there have been significant increases in the number of manufacturers. In 2006, Turkish farmers under certified GLOBALGAP producer were 3,222 and by the end of 2007 the number has reached 6,905 certified GLOBALGAP producers (GLOBALGAP, 2010).

In 2012, 47 provinces and 3,676 farmers were produced under GAPs principles. This rate was compared with the figures in 2007, according to as a province, 161% of certified producers, according to the production 434% of certified producers; 1461% of total certified producers, and this showed that there is an increase in the rate of certified producers (MFAL, 2014a). The Table 4.1 shows crops in producer under GAPs principles in Turkey.

Table 4.2. Crops produced under GAPs principles in Turkey (MFAL, 2014b)

Product name	The number of producers	Production area (da)
Lemon	477	54.965
Maize	411	24.843
Tangerine	409	62.098.585
Orange	375	99.758
Tomato	341	29.209
Banana	340	2.661
Apple	313	37.072
Olive	309	42.067
Pistachios	231	47.892
Potato	17	79.764
Pomegranate	150	59.914
Paddy (Rice)	12	44.788

The crops produced under GAPs principles, according to a number of producers lemon, maize and tangerine were taken the first three ranks. According to the production area, the first three largest production area were tangerine, orange and potato. The table 4.2 implies that our country within the scope of GAPs fruits produced under GAPs principles were more than crops produced under GAPs principles and after year by year their production continue in an incremental manner.

The framework of GAPs with the aim of encouraging farmers to produce under GAPs principles, the ministry of food, agriculture and livestock supported them. In 2014, a decision was made by the ministry for the support of producers under GAPs principles was dated 12.04.2014 and published Resmi newspapers' no. 28970. According to the newspaper, the ministry determined a 50 TL in per decare (da) of support for producers under GAPs principles cultivating the normal farm and 150 TL in per decare (da) for the producers using principles of GAPs and cultivating under greenhouses.

4.8 Bafra Vegetable Producers' Union

Vegetable Union in Bafra founded in 2007 by the combination of 393 vegetable producers residing 33 villages in Bafra district. The reason was to raise income levels of producers and also increase their agricultural production in accordance with the charter of unity. The number of vegetable producers has reached 550 members in 2014 (URL – 7).

The activities of union are as follows:

- Do market research about the members' products,
- To find a market the members' products and regulating the supply of the products going to the market,
- Providing members technical support for harvesting, storage, and packaging of the products,
- To find a way to help the input supply of the members,
- To ensure the varieties of the production suitable for the domestic and international markets,
- To provide consulting, training and extension services,
- To take remedial measures for the quality of the product and apply product standards,
- Monitoring agricultural practices at the farm level, keeping records, and arranging their documents,
- To ensure the implementation of the standards related processing and packaging,
- To rent a warehouse if necessary on behalf of the members to store their products,
- Providing awareness of promoting activities of the product,
- To make record keeping for all kinds of products produced by vegetable producers,
- Carry out product regulations required by the Republic of Turkey and international free market.
- On behalf of the members organize and coordinate related activities of contracts for the product and ensuring the types of contracts that is better for the producer.

4.8.1 Mission of the union

According to agricultural policy of Turkish government, the mission of the union is to assist the member producers to increase the production of vegetables, to improve the quality of the vegetables, according to the policy to give technical practices, to meet the need of vegetable producers toward domestic and international marketing, assist import and export activities, and their income level.

4.8.2 Vision of the union

The vision of the union is according to the terms of emerging markets, improving the quality, efficiency and diversity of the product, especially the vegetable products produced by Bafra district vegetable producers will sell in the domestic and international markets.

4.8.3 Produced products

Summer vegetables: Vegetables that grow in summer include melon, watermelon, tomatoes, peppers, eggplant, beans, and squash.
Winter vegetables: White cabbage, red cabbage, broccoli, cauliflower, leeks, radishes, lettuce, chinese cabbage, brussels' sprouts, parsley, and kocabaş are vegetables that grow in winter.
Certified products: the vegetables that got certification from the union are melon, watermelon, tomatoes, pepper, white cabbage, red cabbage, broccoli, cauliflower, and leeks.

The Figure 4.2 shows the managerial structure of Vegetable Producers' Union in Bafra. The board of directors includes the chairman, vice chairman, accountant and two members. They are the decision-makers of union. Two consultants and internal accountant are the staff of the union.

Figure 4.2. Managerial structure of the Bafra Vegetable Producers' Union

Source: (URL – 7)

<table>
<tr><td colspan="12">The Board of Directors</td></tr>
<tr><td colspan="12">Chairman</td></tr>
<tr><td colspan="3">Vice Chairman</td><td colspan="3">Accountant</td><td colspan="3">Member</td><td colspan="3">Member</td></tr>
<tr><td colspan="12">Staff</td></tr>
<tr><td colspan="4">Consultant</td><td colspan="4">Consultant</td><td colspan="4">Internal Accountant</td></tr>
</table>

A good agricultural practice was started 8 years ago in Bafra district. Vegetables and rice that are used by good agricultural practices are more productive than others. When good agricultural practices started in Bafra district, the farmers who are adopted were very less. Today 220 rice and vegetable farmers that have adopted good agricultural practices cultivate 16, 000 acres for rice and 4000 acres for summer and winter vegetables. The loss of watermelon and melon is reduced by adoption of good agricultural practices (URL- 8).

5. MATERIALS AND METHODS

5.1 Introduction to Materials and Methods

This chapter, the materials and methods of the thesis will be discussed. The statement of the problem, the aims and objectives of the study that deals with this thesis and the research questions of the study will be presented. The analytical methods of the study also will be discussed. In this chapter, the data collection methods of research, the limitations of the study are also explained.

5.2 Statement of the Problem

It was predicted that information systems for adopters and non-adopters of GAPs already exist in the research area. There are presumably subsystems of the information system, which can be defined as different categories (adopters, non-adopters and others), the public services (district agricultural officer, the research institute, the university and other), pesticide/fertilizer dealers, local farmers' associations, and the mass media. In addition, some international public and private organizations may be part of the information system. It is assumed that these organizations will provide information for farmers and that farmers will seek and use available information about GAPs. Using selected sources, the farmer will meet their own information needs and exchange information with others. Information transfer and other information related processes presumably occur in the system. In terms of this system, the actors (individual and organizational) will interact, and information will be generated, transferred, exchanged and disseminated. However, these processes may well differ between adopters and non-adopters of GAPs.

The poor information about GAPs was caused misconception by conventional farmers. This is also brought that conventional farmers reject the adoption of GAPs and continue abusing of chemical fertilizers. The availability of enough information about GAPs for conventional farmers could make easy to persuade them to convert to adopters of GAPs.

The main research question of this study was: How do the current information systems of adopters and non-adopters of GAPs function in the research area?

5.3 Research Objectives

The main objective of this study related to comparison of agricultural knowledge and information systems (AKIS) for adopters and non-adopters of good agricultural practices (GAPs) in Bafra district. The study compares the utilization of information related to adopters and non-adopters of GAPs.

There are many reasons that farmers should understand the importance of Good Agricultural practices. GAPs protocols were developed in response to the increase in the number of outbreaks of foodborne diseases resulting from contaminated fresh produce. While most consumers associate food-borne diseases with improperly stored or poorly cooked animal products, it is clear that contaminated fruits and vegetables can also present a risk. Produce can become contaminated by any of a number of microbes (bacteria, viruses, parasites, or fungi) at any stage of production, processing, packaging, or marketing. While the cooking process would normally kill these microorganisms, fresh produce is often consumed raw and thus, at risk. Many researches related to food safety shows that the detection of residual pathogens prior to marketing.

The basic objectives of this research are as follows:

1. To identify the socio-economic characteristics of adopters and non-adopters of good agricultural practices (Section 6.2).
2. To compare the labor force required by adopters and non-adopters of GAPs (Section 6.2.3)
3. To know the membership situation of adopters and non-adopters of GAPs in farmers' organizations (section 6.5).
4. To examine the channels of information and sources of information dependence used by adopters of GAPs (Section 6.9).
5. To explore adopters and non-adopters of GAPs usage of information. (Section 6.15)
6. To explore the adoption of new innovations of GAPs by adopters of GAPs (Section 6.18).

5.4 Scope and Limitations of the Study

The scope of the study related the AKIS of adopters and non-adopters of GAPs. Most of the information sources are MFAL, public agricultural institutions, chambers of agriculture, agricultural consultants, media, etc. Interactions and information sharing of actors in the system also spreads important information that adopters of good agriculture practices need.

For this purpose, in this study, farming systems, social capital, the adoption of innovation and communication will benefit from AKIS theory.

There is a limited data on comparison of agricultural knowledge and information systems (AKIS) for adopters and non-adopters of GAPs and no analysis has been done on existing Good Agricultural Practices (GAPs) based on information and knowledge in the Bafra district of Samsun province, Turkey.

Data collection methods were included interview and observation methods. The purpose of the study of the cooperatives they create adopters of GAPs. One of the most important goals of this research is socio-economic characteristics of non-adopters and adopters of good agricultural practices and analysis of information they have created, and because of the comparison of conventional growers and GAP growers' differences.

5.5 Research Questions

In this section, research questions causing the emergence of research are as follows:

1. Are there differences in the socio-economic factors of adopters and non-adopters of GAPs? (Section 6.2)
2. Are there differences of number of labor force required by adopters and non-adopters of GAPs? (Section 6.2.3)
3. Are there differences participations in farmers' organizations for adopters and non-adopters of GAPs? (Section 6.5).
4. Are there differences, challenges of source of information for adopters and non-adopters of GAPs? (Section 6.15).
5. What are the reasons for rejecting the beginning of GAPs for non-adopters of GAPs (conventional farmers) (Section 6.16) ?

6. Are adopters of GAPs adopted the new innovations of good agricultural practices (GAPs)? (Section 6.18).

5.6 Research Hypothesis

In this section, research hypothesis are searching answers for the research questions before performing statistical analysis and using the previous research analysis and research results from a pilot study. Then the data obtained from farmers through questionnaire study will be conducted to test the relevant statistical methods.

The Alternative hypotheses of the thesis are as follows:

1. There are differences in terms of socio-economic factors for adopters and non-adopters of GAPs (Section 6.2).
2. There are differences in the labor force (farm workers) required by adopters and non-adopters of GAPs (Section 6.2.3).
3. There is a difference of membership situation between adopters and non-adopters of GAPs in farmers' organizations (Section 6.5).
4. There are many channels of information and sources of information dependence used by adopters of GAPs (Section 6.9).
5. There are difference between adopters and non-adopters of GAPs for the usage of information (Section 6.15).
6. Adopters of (GAPs) adopted the new innovations from good agricultural practices (GAPs) (Section 6.18).

5.7 Data Collection, Methods and Instruments

The study used data obtained from survey and direct observations to collect as primary data. These multiple data collection techniques were used in order to increase the validity and reliability of the obtained. The research instrument was in the form of a questionnaire. Some of the questionnaire was like socio-economic information such as age, education level, agricultural experience, farm size, source of income (on-farm and off-farm income) and agricultural organization's membership status.

There are nearly 150 adopters of GAPs and more than 1000 non-adopters of GAPs in Bafra district. 34 out of 150 of adopters of GAPs and 40 out of 1000 non-adopters of GAPs were used as sample for the study. Purposive sampling was used to select the sample of the research. Purposive sampling, also known as judgmental, selective or subjective sampling, is a type of non-probability sampling technique. Non-probability sampling focuses on sampling techniques where the units that are investigated are based on the judgment of the researcher.

Fener, Agillar, Sarikoy and Orencik villages of Bafra district were selected for the study. Most of the adopters of GAPs were live Sarikoy and Agillar villages. While interviewing adopters of GAPs, there were also conventional farmers who live there. The study was not considered the population that lives in these villages. Approximately, 150 of adopters of GAPs and thousands of non-adopters of GAPs were living in the villages. Bafra district is one of the districts that many adopters of GAPs are live, and this was the reason the study was selected to analyze the adopters of GAPs that live in it. Additionally, there were also conventional farmers (non-adopters of GAPs) in the same area with adopters of GAPs. The questionnaire contains questions concerned both of the groups.

5.8 Calculation of Total Information Scores

According to Demiryurek (2008), information scores for each component of the farmers' agricultural information system can be calculated by multiplying the weights of information contact with degree of information usefulness. Following Demiryurek (2008), Total Information Score (TIS) is formulated as:

$$TIS_{ij} = \sum_i^j FC_{ij} * IU_{ij}$$

Where FC_{ij} is the number of contacts with j-th information channel to the i-th adopter of GAPs and IU_{ij} is the usefulness of j-th information channel to the i-th adopter of GAPs. The weights were given to each component according to the extent of information contact.

- The weight of 0 was given to no contact,
- 1 for once a year,
- 2 for two or three times a year,

- 4 for four or five times a year,
- 12 for once a month,
- 30 for two or three times a month,
- 52 for once a week,
- 130 for two or three times a week and
- 365 for information contacts once a day.

Similarly, the degree of usefulness of information sources was also weighted.

- The weight of 0 was given to not useful at all,
- 0.25 for little useful,
- 0.50 for somewhat useful,
- 0.75 for useful and
- 1.00 for very useful.

The scores were calculated on the basis of percentages of farmers' reporting each level of use of the sources.

5.9 Statistical Analysis

The data obtained through a questionnaire, were made primarily on processed by Statistical Package for the Social Sciences (SPPS) program on the computer. Variables related to socio-economic aspects of adopters and non-adopters of GAPs farmers were compared and classified as parametric and non-parametric variables.

In the questionnaire, questions related to most important factors for GAPs practices were asked and the important factors were environmental protection factors (soil, plant, animal and water protection), innovation (need for testing new and different things), health factors (protecting of the health of himself, his family, his workers and his consumers), economic factors (premium price, supports, save costs, profits etc.), and social factors (company, union, other GAPs producers support etc.) respectively.

The quantitative data were analyzed using descriptive statistical tools including mean, frequency distributions, percentages, charts and simple correlations. Correlation analysis was employed to examine the relationship between the personal, demographic and socio-economic factors of farmers (independent variables) and the performance of AKIS of GAPs (dependent variables).

5.9.1 Dependent variables

The dependent variable in this study is the performance of comparison of AKIS for adopters of and non-adopters of GAPs. The analysis of AKIS in a specific farming may provide the identification of the basic components and structure of the system, different sources of information used by different components in the system the understanding of how successful the system works and how to improve system performance (Demiryürek, 2000).

5.9.2 Independent variables

The following independent variables were hypothesized to influence the performance of agricultural knowledge and information systems (AKIS) for adopters and non-adopters of GAPs in the study area.

5.9.2.1 Agricultural Information and Sources

Agricultural information sources were identified initially in collaboration with the Bafra Vegetable Farmers Union in the study area. In order to document these sources, the respondents were asked to specify each source of information and their degree of usefulness. The degree of usefulness was ranked 1 for very useful, 2 for useful, 3 for less useful, and 4 for not useful.

5.9.2.2 Agricultural Information Access

Available literature has shown that farmers need to have access to agricultural information in order to improve agricultural production. In order to document information access, the respondents were asked to first specify the sources of information and meeting frequency of access the previous year. A weight of everyday, 2-3 days per week, 1 day per week, 2-3 days per month, 1 day per month, 4-5 days per year, 1 day per year, and no meeting at all.

5.9.2.3 Agricultural Information Requirements

Working collaboration with Bafra Vegetable Farmers Union in the study area, the researcher initially identified the agricultural information requirements of adopters of GAPs and these includes understanding of what good agricultural practices ordering the farmers and knowing the importance of food safety and quality, access to international markets after giving the certification.

In this study the respondents were asked to specify the information they require on good agricultural practices (GAPs) from different sources.

5.9.2.4 Personal and socio-economic factors of adopters and non-adopters of GAPs

This study sought to find out personal and socio-demographics factors that influence agricultural information for adopters and non-adopters of GAPs.

Formal education is a highest education qualification attained by the smallholder food crops farmers. This was measured in terms of 1=illiterate, 2=primary, 3=intermediate school 4= secondary school, and 5= university.

Agricultural income is the income obtained from the sale of crops and livestock. High income earned from the agricultural activities generally increases the farmers' financial capacity and may help in adoption of new technologies.

Subsequently, agricultural income is expected to positively influence the performance of agricultural information systems. Agricultural experience is the number of years, farmers have been farming and longer farming experience implies accumulated farming knowledge and skills.

5.10 Variables used in the Research

Variables for the study will be used to test the hypothesis in the research areas covered are listed in Table 5.1. Identifying research variables previously described and purpose of clarification that is composed of independent and dependent variables disclosed below.

Table 5.1. Research variables and statistical tests were used

Variables	Statistical tests to be used
1. Farmers socio-economic characteristics	
1.1. Age	Year, t-test
1.2. Educational Status	Year, Mann-Whitney U
1.3. Labor force status	t-test
1.4. Off-farm and on-farm income	t-test
1.5. Agricultural experience (years)	t-test
1.6. Social security	$\chi 2$
2. Membership status of agricultural organizations	Frequency, $\chi 2$
3. Farmers' farm size and the number of parcels in the farm	t-test
4. Animal production	t-test
5. Crop production value	t-test
6. Good agricultural practices and knowledge and information sources	Frequency, Percentage
7. Benefit status of good agricultural practices, supports:	Frequency, Percentage
8. Status of Insurance-Using for Adopters of GAPs	Frequency, Percentage
9. Ownership status of good agricultural practices (GAPs) certification	Frequency, Percentage
10. Type of information required by adopters of GAPs	Frequency
11. Adopters and non-adopters of GAPs information usage situation	Frequency, Percentage
12. Factors related the adoption of good agricultural practices (GAPs).	Frequency

13. Reasons for rejecting the beginning of good agricultural practices (GAPs) (for conventional farmers)	Frequency
14. Good agricultural practices (GAPs) with new innovation	Frequency
15. Problems of adopters of good agricultural practices (GAPs)	Frequency

6. RESEARCH FINDINGS

6.1 Introduction to Research Findings

In this chapter, research findings of the thesis will be explained. The socio-economic characteristics of farmers will be described. Farming experience, social security (SGK), and organizational membership of farmers will be presented. Ownership and land use status of farmers, livestock and plant products will be analyzed. Farmers' source of information and knowledge of GAPs are being presented.

6.2 Socio-economic Characteristics of Farmers

Farming is a multi-disciplinary science, not only bio-technical and environmental factors, but also socio-economic issues. Economic research assists both farmers and policy makers (Shang, 1994). Socio-economic examines social and economic factors to better understand how the combination of both influences something.

The study examines the socio-economic factors of farmers in Bafra. Using SPPS program results the research showed us factors like age, education, population and farm labor status, off-farm income of farmers and so on.

6.2.1 Age

Age of the farmer sometimes effected decision-making about what to plant, when to plant, how to plant, and where to plant. If the farmer is an old farmer, he has a lot of experiences and those experiences helping him to grow what more productive, more available and more resistant to the pests. However, the small-scale farming system encounters sever structural problems, particularly the rapid ageing of the farmer population and the scarcity of young farmers entering the profession. The consequences of unsolved structural problems will hamper sustainable agricultural development (Ilbery, *et al.*, 1997).

The age-related structural crisis will lead to an array of agricultural development problems; in particular, farm productivity, market competitiveness, rural economic viability and food security will be under threat. These challenges related to the lack of generational renewal in the farming system should overcome to secure agricultural sustainability. Therefore, determining how to support young farmers is a political priority for the future agricultural policy regarding the small-holding farming, world (Hazell, *et al.*, 2007).

Table 6.1. The age of farmers and the test results

	Mode of Production	No. of Person	Average	Minimum	Maximum	Std. deviation
Age	Adopters of GAPs	37	47.16	28	65	9.70
	Non-adopters of GAPs	40	49.98	24	80	12.54

t= -1.094   p= 0.277

Table 6.1 presented that there was no statistical difference between the ages of adopters and non-adopters of GAPs farmers ($p<0.05$). It seems that age had not have relationship with the adoption of GAPs. This might because of the difference of age level. Older farmers who had experience on old fashioned practices were interested new way of farming practices.

This study supported by Aydoğan (2012) examined comparison of sources of communication and social network analysis for organic and conventional hazelnut growers in Terme and Çarşamba districts of Samsun province and found that there was no statistical difference between ages of organic and conventional hazelnut growers. Demiryürek *et al.* (2015) conducted research on effect of dairy cattle breeders' association membership on sustainability in Samsun province and found that there was no significant difference between members and non-members in terms of their age.

Loan *et al.* (2015) examined the adoption of GAPs in the Lychee crop in Vietnam and found that the difference in age between adopters and non-adopters of GAPs was not significant. U – rungsimawong (2000) examined factors related to the adoption of Neem extracts use an insecticide in Thailand and found that age had no relationship with the adoption of farmers of the prevention of pests by using Neem extracts.

6.2.2 Educational status

Education is the production of desirable changes in knowledge (things known), attitude (things felt) and skills (things done), either in all (or) one or more of human behavior. Education is also the act or process of imparting or acquiring particular knowledge or skills, as for a profession. Extension Education is defined as an educational process to provide knowledge to the rural people about the improved practices in a convincing manner and help them to take a decision within their specific local conditions (Dahama, 1973).

Education is an integral part of the extension. The basic concept of extension is that it is education. The extension means that type of education, which is stretched out, to the people in rural areas, beyond the limits of the educational institutions to which the formal type of education is normally confined.

Extension education is primarily for the rural development. Its main objective is to bring necessary change in the beliefs or views of people. Extension education is an educational process by which capabilities among people are developed to understand their problems and resources. It is utilized to make scientific methods available to the rural people, so that they can raise their agricultural production and their standard of living. The results of the educational status of adopters and non-adopters of GAPs had given in Table 6.2.

Table 6.2. Education level of the respondents

Educational level	Adopters of GAPs		Non-adopters of GAPs	
Primary	25	67.56%	26	65%
Intermediate	7	18.91%	10	25%
Secondary	3	8.10%	3	7.5%
University	2	5.40%	1	2.5%
Total	37	100%	40	100%

Mann-Whitney U= 733.500 p= 0.937

Education of the farmer has been assumed to have a positive influence on the farmers' decision to adopt new technology. However, this study showed that there was no statistically difference between adopters and non-adopters of GAPs and it seems that education did not affect the adoption of GAPs ($P<0.05$). Demiryürek *et al.*

(2015) conducted research on effect of dairy cattle breeders' association membership on sustainability in Samsun province and found that there was no significant difference between members and non-members in terms of their educational background.

In contrary to this study Okunlola *et al.* (2011) on adoption of new technologies by fish farmers and Ajewole *et al.* (2010) on adoption of the technology of organic fertilizers in Nigeria found that the level of education had a positive and significant influence on the adoption of the technology.

6.2.3 Household size and labor force status

Labor is one of the important factors of farming system. The agricultural sector has some special characteristics that make it more difficult, compared to other sectors, to know precisely how many people it employs. Firstly, agriculture is still dominated by family farms, where family members provide labor input at different times of the year. Secondly, many farmers and farm workers pursue agriculture as a part-time activity and have other more or less important sources of income. Thirdly, agriculture is characterized by seasonal labor peaks, where large numbers of workers may be hired for relatively short periods (URL-8).

Labor bottlenecks resulting from relative higher labor requirements are also cited as a constraint to the adoption of conservation technology, especially if new technologies create seasonal peaks that overlap with other agricultural activities (Knox & Meinzen-Dick, 1999).

Household size is simply used as a measure of labor availability. It determines adoption in that, a larger household have the capacity to relax the labor constraints required during introduction of new technology (Mignouna *et al,* 2011; Bonabana-Wabbi, 2002). Table 6.3 presented the household size and labor force status.

Table 6.3. Production system based on household size and labor force status

	Mode of Production	Average (person)	Std. deviation	T	p
Household size	Adopters of GAPs	5.08	2.812	2.823	0.009
	Non-adopters of GAPs	3.72	1.109		
Family members working in the farm	Adopters of GAPs	2.135	1.7506	-1.395	0.167
	Non-adopters of GAPs	2.625	1.3144		
Hired workers	Adopters of GAPs	33.19	32.769	-1.537	0.128
	Non-adopters of GAPs	44.48	31.636		

The number of persons in the family, the number of family members working in the farm and hired workers was presented. In the analyzing data, there was a statistical difference, according to the number of persons in the family ($p<0.05$). The household size of adopters of GAPs was more than household size of non-adopters of GAPs. Studies conducted by Padel (2008), Olhan (1997), Demiryürek (2010) and Aydoğan (2012) found that organic producers' household size was more than conventional producer's household size. They concluded that the household size determined the method of production. According to family members working in the farm there was no statistically difference between adopters and non-adopters of GAPs ($p>0.05$), in terms of family members working in the farm. This might be because of adopters and non-adopters GAPs allocated the same number of persons from their household to work the farm. Also, there was no statistically difference between adopters and non-adopters of GAPs in terms of hired workers for their farms. It was expected that the hired workers of adopters of GAPs would be more than the hired workers of non-adopters of GAPs. This might because of the need of hired workers of both groups were the same and there is no difference in terms of hired workers. This study supported by Tawadchai, *et al.* (2006) examined the adoption of GAPs for beef cattle farming in Thailand and found that labor use in raising beef cattle did not affect the adoption of GAPs about beef cattle – raising because most of the beef cattle raisers in this study were family members and there was no difference found between type of persons raising beef cattle and GAPs about beef cattle – raising.

6.2.4 Off-farm income status

Off-farm (non-farm) income refers to the portion of farm household income obtained off the farm, including non-farm wages and salaries, pensions, and interest income earned by farm families.

Over the last two decades, the non-farm economy has increasingly become the central focus of attention in rural development policy, due to its positive contribution to poverty reduction and food security (Reardon 1998; Lanjouw and Lanjouw 2001; Davis 2003). Participation in non-farm activities is one of the livelihood strategies among poor rural households in many developing countries (Mduma and Wobst 2005).

The rural non-farm sector plays a critical role in promoting growth and welfare by slowing rural-urban migration, providing alternative employment for those left out of agriculture, and improving household security through diversification (Lanjouw and Lanjouw, 1999).

In Table 6.4 presented that there was no statistical difference of off-farm activities between adopters and non-adopters of GAPs ($p<0.05$). The result of the study showed that off-farm income of adopters of GAPs is 56.76% and off-farm income of non-adopters of GAPs becomes 40%. The off-farm income of adopters GAPs was higher than off-farm income of non-adopters of GAPs. This might be because of the innovation of GAPs had increased the income level of adopters of GAPs from off-farm activities. There was a proportional relationship between the income of farmers with the adoption of innovations (Sezgin, 2008; Köksal, 2009). The study also supported by Reardon *et al* (2007) examined rural non-farm employment in developing countries and found that off-farm income has a positive impact on technology adoption. This is because off-farm act as an important strategy for overcoming credit constraints faced by the rural households in many developing countries.

Table 6.4. Production system based on sources of off-farm income

Sources of off-farm income	Mode of Production			
	Adopters of GAPs		Non-adopters of GAPs	
	N	%	N	%
No off-farm income	16	43.24	24	60
Worker	1	2.71	5	12.5
Public servant	4	10.81	2	5
Trader	2	5.40	0	0
Pension	9	24.32	4	10
Food buyer	1	2.71	0	0
Animal production	4	10.81	5	12.5
Total	37	100	40	100

x^2= 6.286 p= 0.373

Table 6.5 presented that there is a statistical difference between on-farm income of adopters and non-adopters of GAPs (p>0.05). The on-farm income of adopters was higher than the non-adopters of GAPs. This might because adopters of GAPs got support and subsidies from the government. This subsidy seems to encourage the adopters of GAPs to continue to be an adopter of GAPs and also the higher income of them could be encouraged non-adopters to be adopters of GAPs.

Table 6.5. The share of income from agricultural production system based on total revenues (%)

Production System	N	Average (%)	Std. deviation	t	P
Adopters of GAPs	37	85.95	24.320	2,674	0.009
Non-adopters of GAPs	40	70.12	27.351		

6.3 Farming Experience

Experience occurs continuously, because the interaction of live creature and environing conditions is involved in the very process of living. Under conditions of resistance and conflict, aspects and elements of the self and the world that are implicated in this interaction qualify experience with emotions and ideas so that conscious intent emerges. However, the experience had is inchoate. Things are experienced but not in such a way that they are composed into the experience (Dewey, 1934).

Table 6.6. Production system based on the farming experience

	Mode of Production	No. of Person	Average	Std. Deviation
Agricultural experience	Adopters of GAPs	37	28.43	14.249
	Non-adopters of GAPs	40	31.43	12.969

t= -0.965   p= 0.338

In Table 6.6 the farming experience of adopters and non-adopters of GAPs had been compared. There is no difference between the average farming experience of adopters of GAPs (28.43 yrs.) and non-adopters of GAPs (31.43 yrs.). The t-test showed no statistically significant difference in terms of experience between adopters and non-adopters of GAPs (p>0.05). This might be because of adopters of GAPs were knew some of principles of practices ordered by GAPs. The principles of practices like food safety and quality, animal welfare and husbandry, farmers' hygiene and environmental protection. The study, supported by (Demiyürek, 2000) conducted research on analysis of information systems for organic and conventional hazelnut producers in Samsun province and found that there was no significant different in terms of farming experience. This study also supported by Tawadchai *et al.* (2006) examined the adoption of GAPs for beef cattle farming in Thailand and found that experience did not affect the adoption of GAPs about beef cattle- raising.

6.4 Social Security Institution (SSI)

Social security is the protection that a society provides to individuals and households to ensure access to health care and to guarantee income security, particularly in cases of old age, unemployment, sickness, invalidity, work injury maternity or loss of a bread winner. Social security was established as basic human right in the ILO's Declaration of Philadelphia (1944) and its Income Security Recommendation, 1944 (No.67). This right is upheld in the Universal Declaration of Human Rights, 1948, and the International Covenant on Economic, Social and Cultural Rights, 1966 Social security has a powerful impact on all levels of society. It provides workers and their families with access to health care and with protection against loss of income, whether it is for short periods of unemployment or sickness or maternity or for a longer time due to invalid or employment injury. It provides older people with income security in their retirement years. Children benefit from social security programs designed to help their families cope with the cost of education. For employers and enterprises, social security help maintain stable labor relations and a productive workforce. (URL-9).

Social security in Turkey generally conceived as strictly referring to the (social) insurance based schemes excluding the unemployment and the health insurance as well as the non-contributory schemes. However, sometimes the concept of social security is to put on the same par as what in other countries is labelled as 'social protection', covering all types of contributory and non-contributory schemes that aim at providing protection in the cases of the occurrence of social risks in line with the ILO Convention No. 102. The Social Security Institution (SSI) was established by Law No 5502 and replaced the Social Insurance Institution (SII), the Pension Fund for civil servants and BAĞKUR, the institution previously entrusted with the administration of social insurance for the self-employed. The SSI is nowadays the main organization entrusted with the administration of the social insurance branches, the universal health insurance and (some of) the non-contributory benefits (URL-10).

Table 6.7 presented that there was a statistical difference between social security of adopters and non-adopters of GAPs ($p<0.05$). Results showed that social security status of two different social security institutions that both adopters and non-adopters had a membership. Adopters of had more membership in BAĞKUR social security institution than non-adopters of GAPs. This might be because of this institution provided farmers information about the security and the idea to obtain income by investing their future pension premiums.

Table 6.7. Production system based on social security institutions

Membership of Social Security Institution (SSI)	Production System			
	Adopters of GAPs		Non-adopters of GAPs	
	No. of person	%	No. of person	%
Membership of SSI	5	13.51	18	45
BAĞKUR	32	86.48	22	55
Total	37	100	40	100

x^2=12.481 p= 0.002

6.5 Farmers' Organizational Status

In rural areas, farmers' organizations are the nearest and often only institutions providing essential goods and services to the rural poor and helping them break from the poverty cycle. Small farmers' income tends to fluctuate seasonally and this can easily tip them into poverty. By providing financial services, farmers' organizations reduce the risk individual farmers' face during seasonal shocks. Farmers' organizations also help mobilize capital and contribute to the growth of the local economy (URL-11).

When two or more people work together to achieve a group result, it is an organization. After the objectives of an organization are established, the functions that must be performed are determined. Personnel requirements are assessed and the physical resources need to accomplish the objectives determined. These elements must then be coordinated into a structural design that will help achieve the objectives. Finally, appropriate responsibilities are assigned (Montana *et al*, 1993).

Table 6.8. Production system based on membership status of farmers' organizations

Farmers' Organizations	Mode of production	Membership %	Total farmers responded
Bafra Rice Producers' Union	Adopters of GAPs	63.3	30
	Non-adopters of GAPs	46.2	13
Bafra Vegetable Producers' Union	Adopters of GAPs	100	37
	Non-adopters of GAPs	0	40
Local Chambers of Agriculture (TZOB)	Adopters of GAPs	100	36
	Non-adopters of GAPs	71.8	39
Irrigation Union	Adopters of GAPs	56.7	37
	Non-adopters of GAPs	40	40
Agricultural Sales Cooperatives	Adopters of GAPs	72.9	37
	Non-adopters of GAPs	52.5	40
Agricultural Credit Cooperatives	Adopters of GAPs	80.6	36
	Non-adopters of GAPs	74.4	39
Cattle Breeding Union	Adopters of GAPs	56.8	37
	Non-adopters of GAPs	37.5	40

Table 6.8 presented that there was a percentage difference between adopters (63.3%) and non-adopters (46.2%) of GAPs for the membership of Bafra Rice Producers' Union. There was a statistical difference between adopters and non-adopters of GAPs for the membership of Bafra Rice Producers' Union. In terms of Bafra Vegetable Producers' Union, all adopters of GAPs had a membership (100%). This might be because of adopters of GAPs got the advice on GAPs principles from Bafra Vegetable Producer's Union. This association works to disseminate the information about GAPs. There was also a percentage difference between adopters (100%) and non-adopters of GAPs (71.8%) for the membership of Local Chambers of Agriculture (TZOB). All adopters of GAPs had a membership to Local Chambers of Agriculture (TZOB). The reason may be those chambers have the records of every farmer and it must be a member of it in order to be registered. In terms of membership of Irrigation Union it seems that both groups had a membership and this reason was to get the water for their farms. According to membership of Agricultural

Sales Cooperatives, there was a statistical difference between adopters and non-adopters of GAPs ($p<0.05$). It implies that agricultural sales cooperatives had significant to both groups (adopters and non-adopters of GAPs). This might be because of information sharing and cooperation that exists in this group may have a benefit to them. The Agricultural Credit Cooperatives, there was no statistical difference between adopters and non-adopters of GAPs ($p>0.05$). This was due to both groups were credit users and credit was very useful for the farmers because it subsidies their income. Agricultural Credit Cooperatives provide farmers' input like animal manure, organic fertilizers, etc. Aydoğan (2012) found that there was no statistical difference between ages of organic and conventional hazelnut growers in terms of Agricultural Credit Cooperatives. It seems that to be a member of the association or group may have a benefit to every farmer whether adopter or non-adopter of GAPs. This might be because of association helped the farmers to be accessing the information about the market and also provide the service they offered. This study supported by Christina *et al,* (2013) conducted research on adoption of food safety and quality standards among Chilean raspberry producers and found that farmer members in a farmers' association or group assists them in the commercialization of their production.

The membership status of farmers' associations can be explained by their satisfaction from these associations. Table 6.9 presents the satisfaction status of farmers. It compared satisfaction scores of all farmers' organizations. The highest score of satisfaction (466.65) got by Bafra Rice Producers' Union while the lowest score of satisfaction got by. Bafra Vegetable Producers' Union is the association disseminates the knowledge and practices of GAPs. This association got the third rank of satisfaction score (436.11). This might be because of non-adopters of GAPs were not a member of this association. The Bafra Vegetable Producers' Union provides consulting, training and extension services, technical support for harvesting, storage, and packaging of the products. It also rents a warehouse if necessary on behalf of the members to store their products.

Table 6.9. Production system based on satisfaction status of farmers' organizations

Farmers' Organizations	Mode of production	Satisfaction Score	*Total Score	Rank
Bafra Rice Producers' Union	Adopters of GAPs	232.44	466.65	1
	Non-adopters of GAPs	234.21		
Local chambers of Agriculture (TZOB)	Adopters of GAPs	245.07	460.07	2
	Non-adopters of GAPs	215		
Irrigation Union	Adopters of GAPs	208.12	428.12	3
	Non-adopters of GAPS	220		
Agricultural Credit Cooperatives	Adopters of GAPs	254.08	421.58	4
	Non-adopters of GAPs	167.5		
Agricultural Sales Cooperatives	Adopters of GAPs	235.15	396.71	5
	Non-adopters of GAPs	161.56		
Cattle Breeding Union	Adopters of GAPs	100	299.6	6
	Non-adopters of GAPs	199.6		
Bafra Vegetable Producers' Union	Adopters of GAPs	270.28	270.28	7
	Non-adopters of GAPs	0		

*Total score = frequency (%) x weight

6.6 Farm Size and Land Use Status

Land ownership (tenure) is the relationship, whether legally or customarily defined, among people, as individuals or groups, with respect to land. (For convenience, "Land is used here to include other natural resources such as water and trees.) Land tenure is an institution, i.e., rules invented by societies to regulate behavior. Rules of tenure define how property rights to land are to be allocated within societies. They define how access is granted to rights to use, control, and transfer land, as well as associated responsibilities and restraints. In simple terms, land tenure systems determine who can use what resources for how long, and under what conditions (FAO, 2002).

Farm size plays a critical role in the adoption of a new technology. Many authors have analyzed farm size as one of important determinant of technology adoption. Farm size can affect and in turn be affected by the other factors influencing adoption (Lavison, 2013).

Table 6.10. Production system based on farm size and land use status

Type of Farm Land	Mode of Production	Average (da)	Std. Deviation	T	P
Total Plain farm land	Adopters of GAPs	113.65	87.179	6.209	0.000
	Non-adopters of GAPs	26.98	13.894		
Total Slope farm land	Adopters of GAPs	0.35	1.531	-4.808	0.000
	Non-adopters of GAPs	9.10	10.963		

Table 6.10 presented that there was a statistical difference between total plain farm land between adopters and non-adopters of GAPs. The result showed that the plain farm size of adopters of GAPs was larger than that of non-adopters. This might because of the owners of larger and specially flat farms are more suitable for vegetable growing with GAPs than those with slope farm land. In terms of slope farm land, non-adopters of GAPs owned more slope farm lands than adopters. Slope farm lands are not suitable planting of vegetables and fruits. The study, supported by Demiyürek (2000) found that organic hazelnut producers had two times larger farm size than conventional producers. The reason may be organic companies preferred to make contract with farmers had larger farm size (Demiyürek, 2010). Aydoğan (2012) found that organic farmers to have larger farm size induced by the organic production system. This study also supported by Veeranant *et al.* (1996) examined influential factors on adoption of commercial beef cattle – raising technology by farmers in Petchabun province, Thailand and found a significant relationship between farm size and the adoption of commercial beef cattle - raising technology.

6.7 Livestock Production

The Turkish livestock sector is characterized by small-scale farms and domestic breeds, which are better to adapt to the harsh climate of eastern Turkey but are less productive. More than half of the nations' herds are in eastern Turkey, despite less suitable topographical and climatic conditions. According to the Turkish government policy, the east and southeast regions of Turkey should be livestock producing regions, and a new support system announced at the end of 2009 pays for 30% of construction costs and 40% of tools and breeding cattle purchase costs for new livestock farms with over 50 heads in East and Southeast Anatolia (URL – 12).

GAPs for dairy farmers are about implementing sound practice on dairy farms. These practices must ensure that the milk and milk products produced are safe and suitable for their intended use, and also that the dairy farm enterprise is viable into the future, from the economic, social and environmental perspectives (FAO, 2011).

Table 6.11 presented the average number of cows for adopters of GAPs were 4.84, while the average number of cows for non-adopters of GAPs was 1.90. There was a statistical difference between the average number of cow keeping by adopters of GAPs and the average number of cow keeping by non-adopters of GAPs ($p>0.05$). In terms of keeping sheep, adopters of GAPs had more sheep average (7.409) than non-adopters. This indicates that good agricultural practices encourage keeping more animals. The animal manure is used as fertilizer for the farm and this is reduced the amount of chemical fertilizers used on the farm. GAPs also encourage the keeping of chickens. Demiyürek (2000) found that organic hazelnut producers keeping more animals than conventional farmers. The study reasoned that organic hazelnut producers used animal manures as an important input.

Table 6.11. Production system based on average livestock products (Livestock Measurement Unit was used; BBHB: Büyükbaş Hayvan Birimi)

	Mode of Production	N	Average	Std. deviation	T	P
Bull	Adopters of GAPs	37	5.97	5.123	2.145	0.035
	Non-adopters of GAPs	40	3.70	4.158		
Middle-bull	Adopters of GAPs	37	4.65	2.574	4.561	0.000
	Non-adopters of GAPs	40	2.10	2.329		
Cow	Adopters of GAPs	37	4.84	5.829	2.966	0.004
	Non-adopters of GAPs	40	1.90	2.216		
Middle-cow	Adopters of GAPs	37	5.27	5.645	3.212	0.002
	Non-adopters of GAPs	40	2.15	2.338		
Calf	Adopters of GAPs	37	5.30	3.605	4.202	0.000
	Non-adopters of GAPs	40	1.93	3.437		
Sheep	Adopters of GAPs	37	8.68	7.409	4.247	0.000
	Non-adopters of GAPs	40	3.08	3.689		
Chicken	Adopters of GAPs	37	17.00	21.180	2.319	0.023
	Non-adopters of GAPs	40	8.98	5.347		
Beehive	Adopters of GAPs	37	2.46	2.745	2.827	0.006
	Non-adopters of GAPs	40	0.95	1.894		

However, Aydoğan (2012) examined comparison of sources of communication and social network analysis for organic and conventional hazelnut growers in Terme and Çarşamba districts of Samsun province and found that the average number of animals keeping by organic hazelnut producers was fallen. It means that organic hazelnut producer keeping animals were less than the conventional animals in average. The study identified that organic farmers were paid most of their income to buy animal manure. This study also supported by Asfaw *et al.* (2007) conducted research about what the impact is EU supermarket standards based on GLOBALGAP standards having on developing countries export of high-value horticultural products in Kenya and found that producers under GLOBALGAP kept more animals than non-GLOBALGAP farmers.

6.8 Crop Production

Crop production, encompassing the series of processes involved in the growing crops – from land preparation through planting to the produce reaching the farm gate, is not operated in isolation, but rather constitutes an integral part of a farming system, which in turn is a constituent of the broader agro-ecosystem and landscape. *A priori,* vegetable production is aimed at providing food security, contribute to sustainable diets, raw materials for industries and, generally to improve and sustain livelihoods (URL – 13).

In table 6.12 presented the comparison of crop production quantity (vegetable crops like watermelon, eggplant, tomatoes and leeks). In terms of production area, the average crop production area of adopters and non-adopters GAPs was 65.38 (da) and 45.83 (da) respectively. There was a statistical difference between adopters and non-adopters of GAPs in terms of crop production ($p>0.05$). The crop production quantity of adopters of GAPs was more than that of non-adopters. The average crop production price of adopters of GAPs was 4.89 TL/kg, while the average crop production price of non-adopters was 3.17 TL/kg..This might be because of the standards for safety and quality used by producers adopting GAPs principles and practices. Another reason may be the demand of vegetable crops produced under GAPs was higher than that of non-adopters. In recent years, consumers care about safety and hygiene of the food. Demiyürek (2000) conducted research on analysis of information systems for organic and conventional hazelnut producers in Samsun province and found that organic hazelnut producer’s production price was higher than that of conventional farmers.

Table 6.12. Comparison of crop production of adopters of GAPs and non-adopters of GAPs

	Mode of Production	N	Average (da/kg/TL)	Std. Deviation	T	P
Crop production area (da)	Adopters of GAPs	37	65.38	11.493	3.197	0.002
	Non-adopters of GAPs	40	45.83	14.145		
*Crop production quantity (kg)	Adopters of GAPs	37	46318.92	28001.564	2.371	0.020
	Non-adopters of GAPs	40	32075.00	24711.813		
Crop Production quantity sold (kg)	Adopters of GAPs	37	67154.05	67614.117	2.757	0.007
	Non-adopters of GAPs	40	34805.00	29470.463		
Crop Production price (TL)	Adopters of GAPs	37	4.86	1.669	3.530	0.001
	Non-adopters of GAPs	40	3.17	2.439		

*Crop production represents:
(Vegetable crops like watermelon, eggplant, tomatoes and leeks)

6.9 Information and Knowledge Sources of adopters GAPs

An improved information and knowledge flow to, from, and within the agricultural sector are a key component in improving small-scale agricultural production and linking increased production to remunerative markets, thus leading to improved rural livelihoods, improving quality and yield, food security and national economies (Asaba *et al*, 2006). Farmers are always curious about what is new in the farming practices. When the farmers heard an innovation and its usefulness they started to adopt. For this reason getting the exact information about a new innovation was very important to farmers.

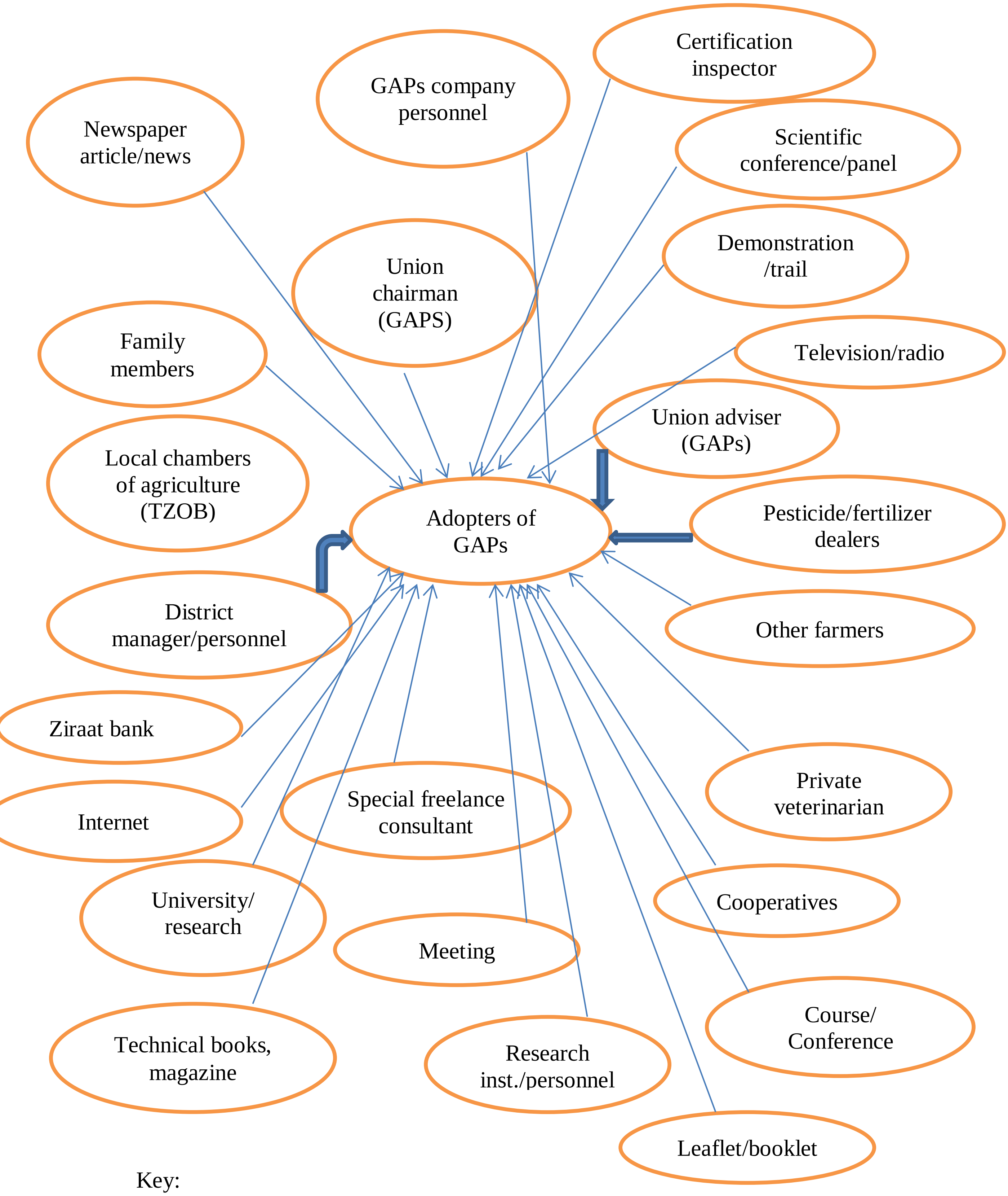
AKIS describe the exchange of knowledge and the services which support these exchanges in rural areas. As a system AKIS links people and organizations to promote mutual learning, to generate, share, and utilize agriculture-related technology, knowledge, and information. Components of an AKIS are diverse actors from the private, public and non-profit sectors relating to agriculture. The system may include the actors such as farmers, farm workers, agricultural educators, researchers, non-academic experts, public and independent private advisors, supply chain actors, and others in the agricultural sector. The public sector functions as a supplier of information, advice and funding for the agricultural sector and assures coordinating activities. Research and education sectors (both private and public) create knowledge and innovation, provide education and advisory services. The private sector also is one of the main parts of AKIS as many thousands of consultants from private sector operate either independently or as part of a large advisory organization (EU SCAR, 2013).

Table 6.13 presented the sources of information and knowledge for adopters of GAPs. The information and knowledge are very important for adopters of GAPs. To access this information and knowledge, it needs information transfer actors that transfers significant information from its sources to the adopters of GAPs. It was expected that family members and fellow farmers were the main source of information for adopters of GAPs. However, the study findings showed that district agricultural manager/personnel were the main sources of agricultural knowledge and information of GAPs in Bafra, with a percentage of 81%, followed by union adviser (GAPs) 54% and pesticide/fertilizer dealers 45.9 as shown in Table 6.13. This might because of pesticide/fertilizer dealers are input suppliers of pesticide and fertilizer for adopters of GAPs. District manager/personnel works as extension agents and maybe he usually had given advice and conduct trainings to the adopters of GAPs and this is reason became the main source of information and knowledge for adopters of GAPs. The study, supported by Rees *et al* (2000) examined AKIS in Kenya and found that government extension agents were the main source of information and knowledge for the farmers. However, Demiyürek (2000) conducted research on analysis of information systems for organic and conventional hazelnut producers in Samsun province and found that agricultural extension agents were not the main sources of information and knowledge to the farmers because agents organized no training activities in the villages.

Table 6.13. The sources of information and knowledge for adopters of GAPs (N= 37)

Sources of information and knowledge	Adopters of GAPs	
	No.	%
Family members	8	21.6
Fellow farmers	14	37.8
Union adviser (GAPs)	20	54
Union chairman (GAPs)	10	27
Certified inspector	0	0
GAPs company personnel	3	8.1
District agricultural manager/personnel	30	81
Research Inst. /Personnel	1	2.7
University/research	5	13.5
Special freelance consultant	8	21.6
A private veterinarian	7	18.9
Pesticide/fertilizer dealers	17	45.9
Cooperatives	7	18.9
Local chambers of agriculture (TZOB)	12	32.4
Agricultural bank	4	10.8
Technical books, magazine	1	2.7
Newspaper article/news	2	5.4
Leaflet/booklet	1	2.7
Television/radio	10	27
Internet	7	18.9
Course/conference	3	8.1
Meeting	5	13.5
Demonstration/trail	2	5.4
Scientific conferences/panel	1	2.7

Explicit sources of knowledge (like television/radio, newspapers, and leaflet/booklets) had low use due to their unavailability and the absence of the reading, listening or watching habit. The findings also suggest that unless to improve their farming skills, farmers will continue to rely on face-to-face communications more than printed materials, watching Television and listening to the radio, advanced ICTs, such as the internet and email. Figure 6.1 presented the concept map for agricultural information of adopters of GAPs. The bold arrows indicated the very important sources of information such as district manager/personnel, union adviser (GAPs) and pesticide/fertilizer dealers for adopters of GAPs. The narrow arrows indicated the important and less important sources of information for adopters of GAPs.



Key:

(Very important)

(Important, less important)

The distance from the center proportionate to access

Lines indicate the perceived importance

Figure 6.1. Concept map for agricultural information of adopters of GAPs

6.10 Benefit Status of GAPs Support for Adopters of GAPs

In order farmers to adopt good agricultural practices (GAPs), farmers got supports and incentives from GAPs programs. There are incentives that can be forged or capitalized upon which can promote the adoption of good practices by producer. These might include: financial support, long term access to credit (and on better terms), increases in income, and improved infrastructure; increases in yield along with reduced waste and inputs and increased biodiversity; increase in market access and positioning; reduction in uncertainties (e.g. contract farming); insurance; improved labor's health and quality; research in developing GAPs for minor crops; and most importantly, the involvement of producers in developing what constitutes good practice in a given context (URL – 14).

Adopters of GAPs in Bafra district of Samsun province, have contact with Vegetable Producers' Union in Bafra. This union is the union that works the dissemination of GAPs principles. It provides adopters of GAPs supports like technical support for harvesting, storage, and packaging of the products. It also provides consulting, training and extension services about food safety and quality. It ensures the implementation of the standards related package and packaging. It also provides suitable fertilizers and fuel for the tractor used to cultivate the farm. It rents a warehouse if necessary on behalf of the members of GAPs to store their products. It makes record keeping for all kinds of products produced by vegetable producers. It works to find a marked the members' products and regulating the supply of the products going to the market. Aydoğan (2012) examined comparison of sources of communication and social network analysis for organic and conventional hazelnut growers in Terme and Çarşamba districts of Samsun province and found that all organic producers were benefit support from Organic company.

In table 6.14 presented that 83.7 adopters of GAPs responded that they benefiting the GAPs support while 16.3 % of adopters of GAPs responded that they did not benefit the supports from GAPs programs.

Table 6.14. Beneficiaries and non-beneficiaries of GAPs support

	Adopters of GAPs	
	Person	%
Benefiting	31	83.7
Not benefiting	6	16.3
Total	37	100

Reasons for no support:

The 16.3% of adopters of GAPs responded that they did not benefit the support of good agricultural practices (GAPs) for the following reasons. 5.40% of adopters of GAPs told that they did not hear the support from good agricultural practices (GAPs). This was indicating that there was an information transfer gap between support providers and adopters of GAPs. s8.11% of adopters of GAPs told that they found the support from good agricultural practices (GAPs) insufficient and they did not need. Another 5.40% adopters of GAPs also told that they have a problem with the legislation or the law of good agricultural practices (GAPs).

6.11 Status of Insurance-Using for Adopters of GAPs

Insurance is considered as one of the most appropriate instruments that deal with different risks (Bokusheva *et al*., 2007). Agricultural insurance is a special line of property insurance applied to agricultural firms. In recognition of the specialized nature of this type of insurance, insurance companies operating in the market either has dedicated agribusiness units of outsource the underwriting to agencies that specialize in it. There are several features of this type of insurance that validate it being treated as a special line of business. Difficulties in achieving adequate diversification because of the nature of the risk, asymmetries of information in underwriting, the geographical dispersion of agricultural production and the complexity of the biological processes of production, which requires skilled and expert underwriting justify it being considered a special business line (Iturrioz, 2009). Agricultural insurance, which was originally started simply as hail insurance, has increasingly been expanded to include many other risks such as frost, flood and drought and, which is also a common practice for governments worldwide, premiums paid by farmers for this coverage were supposed to be subsidized. In Turkey, the development of agricultural insurance was thwarted primarily by such factors as rapid declines in farmers' income levels, the failure of successive governments to develop coherent agricultural policies over the years, and considerable ignorance and disinterest in this issue from the side of both agriculture and insurance sector (TSRBS, 2004).

Table 6.15 presented the majority of the adopters of GAPs was used agriculture insurance. 70.27% of adopters of GAPs had access to agricultural insurance. The first company that provides insurance to adopters of GAPs was TAKSIM. This company provides insurance for rice production not for vegetable production. It provides insurance 62.17 % of adopters of GAPs. The second that also provides insurance to adopters of GAPs was a company called GÜNEŞ. This company also provides insurance for rice production not for vegetable production. It also provides insurance 2.70% of adopters of GAPs. The third insurance provider was Agricultural Credit Cooperatives. This company provides insurance for vegetable production. It provides insurance 2.40% of adopters of GAPs. The reasons for a high number of adopters of GAPs became insurance users maybe they had a knowledge about insurance and how it works and might be they got this knowledge through trainings and seminars conducted by the companies and cooperatives that provide insurance. They might be because of believing that using insurance was more profitable than without insurance. However, Aydoğan (2012) examined comparison of sources of communication and social network analysis for organic and conventional hazelnut growers in Terme and Çarşamba districts of Samsun province and found that the majority of organic producer were not use insurance. He identified that organic producers did not have enough knowledge about the use of insurance and also that they believe that there was no need of using insurance. This study also contradicted by a study conducted Velandia *et al.*(2009) examined factors affecting farmers' utilization of agricultural risk management tools and found that 46% were insurance users. The percentage of adopters of GAPs that was not accessible to agricultural insurance was 29.73% because of the reasons below written.

Reasons for no Insurance:

- Their farm land was smaller than the farm size a farmer can get insurance.
- Cost of insurance was very high.
- Lack of knowledge about insurance and how it works.

Table 6.15. Users and non-users of insurance for adopters of GAPs

	Adopters of GAPs	
	Person	%
Use insurance	26	70.27
Not use insurance	11	29.73
Total	37	100

6.12 Certification Ownership Status of Adopters of GAPs

Certification is the (voluntary) assessment and approval by a (accredited) part on a (accredited) standard. At this definition suggests, 'Certification' is a very broadly used term. However, it certainly involves an assessment and an approval of some standard. The 'approval of good practice' distinguishes certification from the activities by national surveillance and control services, which do not go any further than evaluating if implemented systems at the company and chain levels fulfill the regulatory standards (Miranda *et al*, 2003).

The purpose of certification is to reach a defined performance and to make this known to stakeholders. Stakeholders may include consumers, (other) customers, governments, risk financing parties (such as banks and insurance companies), and society as a whole. Also, the company itself can be a stakeholder, since certification of food safety and traceability systems gives organizations a tangible approval of good practice and a tool for a due diligence defense in the case of product safety, Buzby *et al,* (1999), Henson *et al*, (2000).

Table 6.16. Certification of adopters of GAPs

	Adopters of GAPs	
	Person	%
Had a certificate	37	100
Not had a certificate	0	0
Total	37	100

Table 6.16 presented that all adopters of GAPs had a certificate. The certificate is provided by Vegetable Producers’ Union in Bafra. Before providing a certificate to adopters of GAPs, the union checked and flow, how the adopters of GAPs were performed terms and principles of GAPs. It starts its regulation from the farm and they checked that adopter of GAPs flow and implement the standards of cultivating and plant of the crop ordered by GAPs principles, crop protection pattern during the crops are on the field, harvesting, storage and packaging. After the control and regulations were approved by the Union the producer was given the certificate. Aydoğan (2012) examined comparison of sources of communication and social network analysis for organic and conventional hazelnut growers in Terme and Çarşamba districts of Samsun province and found that all organic producers had provided their certificates.

6.13 Types of Information required by Adopters of GAPs

Information is an important factor in agriculture and it is the basis of extension service delivery. It is defined by Adereti *et al,* (2006) as data that have been put into a meaningful and useful context which is communicated to a recipient who uses it to make decisions. According to Demiryurek *et al.* (2008), found that agricultural information is an important factor that interacts with other production factors. The productivity of these other factors, such as land, labor, capital and managerial ability, can arguably be improved by relevant, reliable and useful information. Information supplied with extension, research, education and agricultural organizations help farmers make better decisions. Therefore, there is a need to understand the functioning of a particular agricultural information system in order to manage and improve it. Information within the hands of the farmers means empowerment through control over their resources and decision-making processes. They noted that being an effective and efficient delivery system of essential information and technology services facilitates the clients' critical role in decision-making towards improved agricultural production, harvesting, and packaging, processing, trading, and marketing (Maningas *et al*, 2000).

In table 6.17 compared the types of information needed by adopters of GAPs. Educational extension was getting the first rank with a total score of (304.4); it means that adopters of GAPs need most the information of educational extension. Educational extension was means of providing training and services to adopters of GAPs. Know-how (Input and Method) with a total score (296.6), was the second important information needed by adopters of GAPs. This implies that there was a need for technical information. Technical information is the information about land preparation, seed selection, planting, and harvesting. The third information needed by adopters of GAPs was the marketing information with a total score of 275.1. The marketing information influences the decision making of adopters of GAPs. Access to marketing information by adopters of GAPs, it helps them to know the situation of the market, the supply and demand of the market. So if the adopters of GAPs had information about the situation of the market, that the market need more supply, then they can decide to produce more and meet the supply requirement of the market. Other information presented were also information needed by producers. In terms of adopters of GAPs educational extension information was main information needed by them. However, Aydoğan (2012) examined comparison of sources of communication and social network analysis for organic and conventional hazelnut growers in Terme and Çarşamba districts of Samsun province and found that information about subsidies was the main information needed by organic producers.

Table 6.17. Comparison of types of information needed by adopters of GAPs

The types of information (weight)	(4) Very much	(3) Much	(2) Some	(1) Few	(0) No	*Total Score	Rank
Educational extension	173.9	104.4	17.4	8.7	0	304.4	1
Know-how (Input and Method	211.2	61.8	17.7	5.9	0	296.6	2
Marketing	216.5	37.5	16.7	4.2	0	275.1	3
Own experience	63.2	173.9	31.6	5.3	0	274	4
Subsidies	123.3	63.2	31.6	10.5	0	228.6	5
Legal official regulations	114.3	53.6	50	7.2	0	225.1	6
Diversification of production	66.7	112.5	16.7	12.5	0	208.4	7
Price	64	108	8	8	0	188	8
Private consultancy gardener	42.1	63.2	0	10.5	0	115.8	9
Private adviser	25.8	48.4	12.9	3.3	0	90.4	10

***Total score** = frequency (%) x weight

6.14 Usage of Information for Adopters and Non-adopters of GAPs

According to Oladele (2006), the role of information for agriculture cannot be over emphasized in enhancing the agricultural development. Information is crucial for increasing agricultural production and improving marketing and distribution strategies. The use of information in agriculture sector is enhancing farming productivity in a number of ways (Bachhav, 2012). Providing information on weather trends, best practice in farming, timely access to market information helps farmer make correct decisions about what crops to plant and where to sell their product and buy inputs.

Table 6.18 presented the comparison of GAPs and non-adopters of GAPs information usage. The majority of adopters and non-adopters responded that ‘They would apply innovation after testing and seeing its usefulness’ with a score of (469.5).This might be because of believing that after testing the new innovation and saw its usefulness for them, then they can begin to adopt it. They also responded in high a number that ‘They would apply after consultation with experts or knowing innovation’ with a score of (422.5). This means that if they had a knowledge for innovation or they got advice from an expert, then they can apply this innovation. With a score (414), adopters and non-adopters responded that ‘They also would apply innovation after other farmers tested and it becomes successful. The imitation behavior is what every farmer has on his mind. If he saw a good practice or innovation that done by his fellow farmer in his field as practical, then mostly it seems that he can decide to adopt the new innovation. The adopters and non-adopters responded that ‘They would apply innovation after changing a little bit, because their working conditions are special for them’ were also presented. This might be because of their confidence to ensure to test the new innovation before adopting it. The lowest score they responded was that ‘They would meet all information that they need’ with a score of (168.7). It seems that they cannot meet all information they need because the information comes from different sources and stakeholders. Although the stakeholders of adopters of GAPs and non-adopters were somewhat different, both groups were very interested to get the latest information regarding new techniques of farming, new methods of cultivation, new crops, seeds, pesticides, the water management, marketing of the product, government policies regarding agriculture, the export potential of their crops and the information about allied activities like fish farming, apiculture, poultry, dairy, and weather information on local and regional levels. Demiyürek (2000) conducted research on analysis of information systems for organic and conventional hazelnut producers in Samsun province and found that organic and conventional hazelnut producer did trials on using inputs, production techniques and pest control methods in order to test, observe and evaluate their applicability before they used them in their farming systems.

Table 6.18. Adopters and non-adopters of GAPs Information Usage

Usefulness	Mode of Production	Appropriateness scores	*Total score	Rank
I would apply innovation after testing and seeing its usefulness.	Adopters of GAPs	257	469.5	1
	Non-adopters of GAPs	212.5		
I would apply after consultation with experts or knowing innovation.	Adopters of GAPs	230	422.5	2
	Non-adopters of GAPs	192.5		
I would apply innovation after other farmers tested and it becomes successful.	Adopters of GAPs	219	414	3
	Non-adopters of GAPs	195		
I would apply directly the knowledge and innovation that I hear from an expert.	Adopters of GAPs	154.1	371.6	4
	Non-adopters of GAPs	217.5		
I would apply innovation after changing a little bit, because my working conditions are special for me.	Adopters of GAPs	167.8	342.8	5
	Non-adopters of GAPs	175		
I would apply information related to my own experience and existing applications.	Adopters of GAPs	154.3	246.8	6
	Non-adopters of GAPs	92.5		
I would meet all information that I need.	Adopters of GAPs	113.7	168.7	7
	Non-adopters of GAPs	55		

*Total score = frequency (%) x weight

6.15 Factors related to the adoption of GAPs

The adoption by farmers of good agricultural practices (GAPs), that favoring the environment and assure food quality and safety, is being a frequent fact. The increasing needs of food quality and safety of consumers, and the social concern for environmental quality and sustainable development, are inducing the agri-food industry in general and the vegetable industry in particular, to increase the quality achievements and control in all phases of the production and marketing process, from farmer to retailer. The extent to which adopters of GAPs adopt available innovation and the speed by which they do so determines the impact of innovation in terms of productivity growth (Pual *et al.* (2003).

Table 6.19 presented environmental protection factors (protection of soil, livestock/animals, plants, and water) innovation (desire to try new or different things), economic factors (premium price, guaranteed of purchase, supports, save costs, profitability.), social factors (company, union, support from other GAPs producers) and health factors (protection of himself, his family, his employees and his consumer health). The environmental factors (soil, livestock/animals, plants, and water protection) were the most effective factors that induced farmers to adopt GAPs and most of the adopters of GAPs have a greater environmental concern and tendency than other groups to adopt the GAPs system. Adopters of GAPs also agree and comply with food safety and standard requirements of importing countries. The second most effective factors that farmers responded were health factors (protection of himself, his family, his employees and his consumer health). GAPs encourage farmers to produce food that is not only wholesome (promoting good health and well-being) and nutritious, but also safe. Adopters of GAPs take great pride in growing high quality, nutritious fruits and vegetables and would never knowingly produce food that could harm their customers. Good agriculture practices (GAPs) came with new innovations (desire to try new or different things). Innovation is an idea, practice or object that is perceived as new by an individual or other unit of adoption (Rogers, 2003). The new innovations of good agricultural practices (GAPs) will be explained more in sector 6.17. Innovation is a third most effective factor related to adoption of GAPs. Economic factors (premium price, guaranteed of purchase, supports, save costs, profitability.) were also related to the adoption of GAPs. Interestingly, economic factors were less important than innovation. Social factors (company, union, and support from other GAPs producers) were least important in terms of adopting of GAPs. This might because of poor communication between the unions and adopters of GAPs. This was identified that there was a need to improve and strength the information transfer of adopters of GAPs and their stakeholders. However, Demiyürek (2000) conducted research on analysis of information systems for organic and conventional hazelnut producers in Samsun province and found that economic factors (especially premium price and market guarantee) were the most important factors related to adopting of organic farming.

Table 6.19. Main factors related to the adoption of GAPs

Types of Factors	It was not effective (0)	Least effective (1)	Most effective (2)	*Total score	Rank
Environmental protection factors	0	21.2	145.5	166.7	1
Health factors	0	48.5	84.5	133	2
Innovation	0	61.3	64.5	125.8	3
Economic factors	0	57.2	64.3	121.5	4
Social factors	0	59.3	14.8	74.1	5

*Total score = frequency (%) x weight
Environmental = (protection of soil, livestock/animals, plants and water)
Health = (protection of himself, his family, his employees, and his consumers)
Innovation = (desire to try new or different things)
Economic = (premium prices, market guarantee, support, save costs, and profitability)
Social = (company, union, support from other GAPs producers)

6.16 Reasons for rejecting the beginning of GAPs (for Conventional Farmers)

Conventional farming (agriculture) is an intensive-type of farming through the application of high-input systems that offer an increased yield. This term is broadly used in the international literature to describe intensive farming (Pacini *et al,* 2003).

Over the last two decades, attention in industrialized countries has focused on reducing pollution by fertilizers and synthetic pesticides in conventional agriculture. The concern of society for the environmental problems caused by conventional farming, in combination with increased demand for achieving sustainability in the agricultural sector and for safe, high-quality foodstuffs, has led to the emergence of alternative farming systems in recent year (Parra-Lopez *et al,* 2007). Conventional farming is a mix of agronomic techniques, some of those quite similar to the organic ones. It could be considered as the most widespread production system in any country, or as well, all the other kind of productive techniques which can be considered as alternatives to the organic ones (Offermann and Nieberg, 2000).

Table 6.20 presented reasons for rejecting good agricultural practices (GAPs) by conventional farmers. Conventional farmers misuse fertilizers and pesticides for the farm and that misuse, mostly caused environmental and soil problems. To be a conventional farmer, it means to do whatever makes your farm more productive and not caring of the food safety and quality, environment and even the health of the farmer himself. It indicated that conventional farmers were more depending on use of fertilizers (chemical fertilizers) and synthetic pesticides. Those were the reasons to reject adoption of GAPs. Another most effective to reject the adoption of GAPs was no without pesticides. This might be because of believing that without using fertilizers, their production could be low. These farmers were accustomed used of fertilizers and pesticides. They need to get information about GAPs and also that GAPs recommend farmers use manure fertilizers and as a pesticide should use suitable pesticides, and cultural practices. Another reason for not adopted GAPs by conventional farmers was that they responded GAPs was not profitable. It seems that this is one of the misconceptions believing by conventional farmers and maybe this was caused poor communication and lack of knowledge about GAPs. In term premium price, most of the conventional farmers complained about that GAPs provide less premium pricing to adopters of GAPs. So if there was less premium pricing, it needs to increase the premium price for adopters of GAPs. The study, supported by Demiyürek (2000) conducted research on analysis of information systems for organic and conventional hazelnut producers in Samsun province and found that conventional producers were accustomed to using of chemicals, and related the yield directly to the use of chemicals.

Table 6.20. Reasons for rejecting the beginning of GAPs (for Conventional Farmers) N= 40

Reasons for Rejecting GAPs	It was not effective (0)	Least effective (1)	Most effective (2)	*Total score	Rank
Not without fertilizers	0	5.2	189.8	195	1
Not without pesticides	0	7.7	184.6	192.6	2
Not profitable	0	20.5	138.5	159	3
Less premium pricing	0	41.1	97.5	138.6	4
Conventional farmers not invited by GAPs facilitators (BVPU)	0	38.5	80	118.5	5
Low yield	0	84.6	30.8	115.4	6
No government support	0	18	80	98	7
Inadequate labor	0	46.2	30.8	77	8
Do not trust company	0	46.2	20.5	66.7	9
Do not know	0	31.6	26.4	58	10
Insecure traders	0	41.1	10.3	51.4	11
Owed to the merchant	0	38.5	5.1	43.6	12
Lack of capital	0	30.8	10.3	41.1	13
Family objections	0	25.7	0	25.7	14
Barrier property owner	0	10.3	0	10.3	15

***Total score = frequency (%) x weight

6.17 GAPs with New Innovation

According to Rogers (2003), diffusion of innovation is a kind of social change. It is a social process that involves interpersonal communication. Communication is a process in which participants create and share information with one another in order to reach mutual understanding. Diffusion is a special form of communication related to new ideas. It is a specific form of social change, defined as a process by which alteration occurs in the structure and functions of a social system.

Rural communities are part of a global society and share its destiny. However, in many ways, they are very specific social organisms, especially when it comes to changes in the countryside and agriculture. Therefore, the process of spreading (diffusion) and introduction (adoption) of innovation, knowledge and technology – which is usually at the center of social change in rural communities – is a complex and contradictory process. Associated with the new innovation of good agricultural practices (GAPs) is practiced of producing “safe and quality food” - farmers and their families that will obtain healthy and good quality food to assure their nutrition and nourishment, generating a value added in their products to access markets in a better way. Innovations of GAPs made some changes the way farming in caring the plant, environment, the health of the farmer and its economic situation.

Table 6.21 presented the fertilizers use of adopters of GAPs. According to the innovation of GAPs, farmers should use alternative methods like organic fertilizers, manures, cultural practices, integrated pest management. Instead of not using alternative methods, fertilizers and pesticides come to the last choice. The farmers should use fertilizers and pesticides in a way of protecting the health of the farmer, production of the crop and the environment. 48.6% of adopters of GAPs responded that they use fertilizers according to the results of soil analysis, while 51.4% of adopters of GAPs not use fertilizers according to the results of soil analysis. This might because of lack of experience about how to analyze the soil. 54.3% responded that after adoption of GAPs the fertilizers use decreased. This implies that GAPs principles suggest that to use fertilizers as a suitable way. In terms of increasing fertilizer use, 8.6% responded that after adoption of GAPs the fertilizer use increased. This was caused maybe the misuse of the practice of GAPs. These principles do not recommend overusing fertilizers. This indicated that there was a gap for information transfer between adopters of GAPs and facilitators of GAPs. However, Aydoğan (2012) examined comparison of sources of communication and social network analysis for organic and conventional hazelnut growers in Terme and Çarşamba districts of Samsun province and found that organic producers used fertilizers according to their experience.

Table 6.21. Fertilizer use of adopters of GAPs

1) Fertilizer Use:	Yes (%)	No (%)
a. According to the results of soil analysis	48.6	51.4
b. According to their experience	11.4	88.6
c. After adoption of GAPs the fertilizer use decreased	54.3	45.7
d. After adoption of GAPs the fertilizer use increased	8.6	91.4
e. After adoption of GAPs the fertilizer use is not changed	28.6	71.4

Table 6.22 presented how adopters of GAPs got the advice and consultant about how to use fertilizers. 23% of adopters responded that they got advice about how to use fertilizers from the District Agricultural Officer. This might be because of they attended trainings and seminars about how to use fertilizers that conducted by the officer. However, 56.5% of adopters of GAPs responded that they used according to their analysis. It seems that most of the adopters of GAPs performed principles of using fertilizers that ordered by GAPs. In terms of connection between Bafra GAPs adviser and adopters of GAPs, 13% of adopters of GAPs responded that they got directly advice about how to use fertilizers from GAPs adviser in Bafra. This indicated also that there was a weak information transfer between adopters of GAPs and GAPs facilitators.

Table 6.22. Advice about how to use fertilizers for adopters of GAPs

a. Advice about how to use fertilizers:	Farmers responded (%)
• District agricultural officer	26
• According to their experiences	56.5
• Bafra GAPs adviser	13
• According to my experience	4.4

Table 6.23. Pesticide use of adopters of GAPs

2) Pesticide Use:	Yes (%)	No (%)
a. According to their experience	16.6	83.4
b. They totally take the advice from the GAPs adviser	23.3	76.7
c. They mixed their knowledge with the advice from the GAPs adviser	23.3	76.7
d. After adoption of GAPs the pesticide use <u>increased</u>	16.3	83.4
e. After adoption of GAPs the pesticide use <u>decreased</u>	60	40
f. After adoption of GAPs the pesticide use is <u>not changed</u>	37.1	62.9

Table 6.23 presented pesticide use of adopters of GAPs. The good agricultural practices (GAPs) order the farmers when they use pesticides to their crops they should use protective materials and use the drug when there is no other alternative. In terms of decreased the pesticide use 60% of adopters of GAPs responded that after adoption of GAPs the pesticide use decreased. This might be because of understanding and implemented the principles of GAPs. These principles provide recommendations about the use pesticides. Pesticides are harmful substances and their use need to be careful. However, 37.7% of adopters of GAPs responded that after adoption of GAPs the pesticide use was not changed. It seems that they used pesticides in a suitable way before adopting GAPs.

Table 6.24. Advice about how to use pesticides for adopters of GAPs

a. Advice about how to use pesticides:	Farmers responded (%)
• District agricultural officer	66.7
• According to their experiences	10
• Bafra GAPs adviser	23.4

Table 6.24 presented advice about how to use pesticides for adopters of GAPs. In terms of using pesticides, 66.7% of adopters of GAPs responded that they got advice from the District Agricultural Officer. This might be because they attended seminars and trainings about how to use pesticides conducted by the officer. 10% of adopters of GAPs responded that they use pesticides according to their experiences. Their experiences can be a useful way of using pesticides or it can be harmful way, so experiences was not enough to flow by adopters of GAPs for using pesticides. The advice from GAPs adviser in Bafra, 23.4% of adopters of GAPs responded that they got advice about how to use pesticides from GAPs adviser.

Table 6.25. The possession of place of pesticide preparation

The possession of place for pesticide preparation	Yes (%)	No (%)
b. Adopters of GAPs have a place for pesticide preparation and storage	100	0
c. Adopters of GAPs took precautions during preparation and application of pesticides	97	3
d. Adopters of GAPs used residue analysis for the products they produce	91.2	8.8
e. Adopters of GAPs made residue analysis for all products	94	6

Table 6.25 presented the possession of place for pesticide preparation. All adopters of GAPs responded that they have a place for pesticide preparation. This might because having a place of pesticide preparation was very important for every adopter of GAPs and also for non-adopters. 97% of adopters of GAPs take precautions during preparation and application of pesticides. This is very important while using pesticides it must be using protections like clothes, gloves, boots and eyeglasses. use residue analysis for the products they produce as GAPs products and residue analysis for all products is to be done properly. 91.2% of adopters of GAPs used residue analysis for the products they produce. This analysis occurs weekly and when there is no wind, according to the weather. Interestingly, 94% adopters of GAPs made residue analysis for all products they produce. Residue analysis was made in Bafra Vegetable Producer's Union Laboratory and District Agricultural Laboratory.

Table 6.26. Empty pesticide containers

g. Empty pesticide containers:	Farmers responded (%)
• Throw to the field	3
• I would dispose of the appropriate procedure	97

Unless empty pesticide containers are managed correctly, they are hazardous to both mankind and the environment. There is a danger that empty containers could be reused for storing food and water, which could result in pesticide poisonings. Containers abundant in the environment can lead to pesticide pollution in soil and groundwater. A container management scheme can minimize these risks and is part of the "life-cycle concept" as addressed *International Code of Conduct on the Distribution and Use of Pesticides.* A container management scheme should ensure that: a) the containers are decontaminated directly following the use of their contents; b) inappropriate use of the empty containers is prevented; and c) it is easy for users to return their empty containers to the scheme (FAO, 2005).

Table 6.26 presented how to disappear empty pesticide containers. Because of the daily advice from GAPs adviser, 97% of adopters of GAPs follow the dispose of the appropriated procedure for empty drug boxes. 3% of adopters of GAPs responded that empty pesticide container throw to the field. Throwing empty pesticide containers can harm the environment. This might be because of they did not get the awareness and information about how keep the empty pesticide containers.

Table 6.27. The possession of bathroom and contract farming situation of adopters of GAPs

3) Is there a bathroom for the use of workers in your field?	Farmers responded (%)
Yes	91.2
No	8.8
4) Do you do contract farming?	
No	100
If yes; which traders/firms	0

Table 6.27 presented the possession of a bathroom and contract farming situation of adopters of GAPs. In terms of possession of a bathroom 91.2% of adopters of GAPs have a bathroom. This might be because they performed the principles of safety of the producers and the environment of GAPs. 8.8% of adopters of GAPs responded that they do not have bathrooms. It seems that they did not get the exact information about having bathrooms. Bathrooms are very important for the sanitation and welfare of the producers and also the environment. Contract farming can be defined as agricultural production carried out according to an agreement between a buyer and farmers, which establishes conditions for the production and marketing of a farm product or products. Typically, the farmer agrees to provide agreed quantities of a specific agricultural product. These should meet the quality standards of the purchaser and be supplied at the time determined by the purchaser. In turn, the buyer commits to purchase the product and, in some cases, to support production through, for example, the supply of farm inputs, land preparation and the provision of technical advice (FAO, 2015). All adopters of GAPs do not do contract farming. They buy their product freely in the local market like non-adopters of GAPs. Although Bafra Vegetable Producers' Union works to find a market the members' products and regulating the supply of the products going to market, there is no contract farming and also local market special to adopters of GAPs.

6.18. Issues related to Adopters of GAPs

Table 6.28 presented the issues related to lack of information, support, lack of warehouse storage condition, high production cost problems, high input costs, diseases and pest problems, lack of labor, low yield, insufficient government support, low price of the product, disputes between farmers, marketing problems and lack of organization and management of adopters of GAPs. The first rank was high input costs with a score of (327.8). This might because apart from the support of GAPs, adopters of GAPs faced high input costs. When the input was high, it means it is more than the output and the producer lost the profit. High production cost was also incurred producers feel disappointed because of losing the profit. Adopters of GAPs also complained about that there were disease and pest problems that caused yield losses. This might because of the use of chemicals for disease and pests was reduced. However, these losses can be minimized by using biological control, crop rotation, trap crops and barrier crops. Insufficient government support was also another problem complained by adopters of GAPs. This can be solved to increase the support of producers by the government because this support supplemented the income of the producer. The low price of the product and marketing problems were one of the main problems of adopters of GAPs. Although the product of adopters of GAPs has a good safety and quality than non-adopters product, when two products came on the market their price was same. This might because of lack of local market special for adopters of GAPs. According to the lack of information adopters of GAPs responded that information from the district directorate was very weak and needed improvement. Information from the research institute and university also needed some improvement. In terms of information from agricultural organizations, GAPs union, GAPs adviser and GAPs certificate inspector seemed to be moderate, they need to improve better. There were small numbers of adopters of GAPs who complained insufficient of warehouse storage conditions. Although Bafra Vegetable Producers' Union to rent a warehouse if necessary on behalf of the members to store their products, it seems the demand of warehouse from adopters of GAPs was not meet enough. In terms of disputes between farmers, it seems that this problem was solved, although there were some producers mentioned it.

Table 6.28. The main problems of adopters of GAPs

The types of Problem (weight)	Too much (4)	Much (3)	Middle (2)	Little (1)	No (0)	*Total score	Rank
High input costs	244.5	83.2	0	0	0	327.8	1
High production costs	194.3	34.3	28.6	0	0	257.2	2
Disease and pest problems	114.3	60	28.6	5.7	0	208.6	3
Insufficient government support	111.2	41.6	27.8	16.7	0	197.3	4
Low price of the product	77.8	41.6	33.3	5.6	0	158.3	5
Lack of labor	77.8	41.6	22.2	2.8	0	144.4	6

Lack of organization	90	33.3	0	8.3	0	131.6	7
Marketing problems	122.3	0	0	8.4	0	130.7	8
Low yield	33.4	41.7	33.3	13.9	0	122.3	9
The district directorate	54.1	24.3	5.4	2.7	0	86.5	10
Past debts from traders	55.6	16.7	5.6	5.6	0	83.5	11
Lack of warehouse and storage condition	44.5	8.3	11.2	8.3	0	72.3	12
Research institute	45.7	0	17.2	5.7	0	68.6	13
University	34.3	0	5.7	5.7	0	45.7	14
GAPs union	11.4	8.6	5.7	2.8	0	28.5	15
GAPs adviser	11.4	8.6	0	2.8	0	22.8	16
Agricultural organization	11.4	8.6	0	2.8	0	22.8	17
GAPs certificate inspector	11.4	0	0	0	0	11.4	18
Disputes between farmers	11.2	0	0	0	0	11.2	19
Private organization	0	0	0	0	0	0	20

*Total score = frequency (%) x weight

7. CONCLUSION AND RECOMMENDATIONS

7.1 Conclusion

The aim of the study was the Comparison of Agricultural Knowledge and Information Systems (AKIS) for Adopters and Non-Adopters of Good Agricultural Practices (GAPs) in Bafra District of Samsun, Turkey. Agricultural Knowledge and Information Systems (AKIS) comprise the institutions and organizations that generate and disseminate knowledge and information to support agricultural production, marketing, and post-harvest handling of agricultural products and management of natural resources.

The main aim of the comparison was the difference between adopters and non-adopters of GAPs. Adopters of GAPs were environmentally sound, they concerned about the environment. Their production was increased by GAPs practices. Although their production needs to inform consumers by the government, they benefit from the use of GAPs. Non-adopters of GAPs were not considered the environment, and they use any chemical fertilizers that they thought which protects their crops. The poor information system in the area also caused the misconceptions of non-adopters of GAPs about GAPs.

Bafra Vegetable Producers' Union was the union that provides support to adopters of GAPs. It provides supports like to find a market the members' products and regulating the supply of the products going to the market. It also provides technical support for harvesting, storage, packaging of the products. It ensures the varieties of the product that suitable for the domestic and international markets. It makes record keeping for all kinds of products produced by vegetable producers. It also ensures the implementation of the standards related processing and packaging of the products. It rents a warehouse if necessary on behalf of the members to store their products.

Socio-economic characteristics of farmers were presented. It was found that there was no significant difference in terms of age, education, off-farm and on-farm income, farming experience for adopters and non-adopters of GAPs. However, there was significantly different according to household size, organizational membership, farm size, livestock and crop production.

Total Information Score (TIS) was used to analyze the information needed by adopters of GAPs. Information scores for each component of the producers' agricultural information system was calculated by multiplying the weights of information contact with the degree of information usefulness. There is a need to strengthen the information required by the adopters of GAPs. It was expected that family members and fellow farmers (other farmers) were the main sources of information for adopters of GAPs. However, the study findings indicated that the district agricultural manager/personnel were the main source of agricultural information of adopters of GAPs, followed by union adviser (GAPs and pesticide/fertilizer dealers. Explicit sources of knowledge (like television/radio, newspapers, leaflet/booklets) had low use due of their unavailability and the absence of the reading, listening or watching habits. The findings also suggest that unless to improve their farming skills, farmers will continue to rely on face-to-face communications more than printed materials, watching television and listening to the radio, advanced ICTs, such as the internet and email.

In terms of insurance using by adopters of GAPs, findings indicated that the majority (70.27%) of adopters of GAPs were insurance users. The reasons for a high number of adopters of GAPs became insurance users maybe they had a knowledge about insurance and how it works and might be they got this knowledge through trainings and seminars conducted by the companies and cooperatives that provide insurance. The companies like TAKSIM and GÜNEŞ provide insurance to adopters of GAPs. Agricultural Credit Cooperatives also provide insurance to adopters of GAPs.

Bafra Vegetable Producers' Union provides certificate to adopters of GAPs. Before providing a certificate to adopters of GAPS, the union checked and flow, how the adopters of GAPs were performed terms and principles of GAPs. It started its regulation from the farm and it checks that adopters of GAPs flow and implement the standards of cultivating and plant of the crop ordered by GAPs principles, crop protection pattern during the crops are on the field, harvesting, storage and packaging. After the control and regulations were approved by the union, the producer was given the certificate.

According to information usage of adopters of GAPs, they would apply innovation after testing and seeing its usefulness. This might be because of believing that after testing the new innovation and saw its usefulness for them, then they can begin to adopt it. They also would apply after consultation with experts or knowing innovation. This means that if they had a knowledge about innovation or they got advice from an expert, then they can decide to apply this innovation.

The most important reason that adopters of GAPs to adopt GAPs was to receive GAPs support from the government. Adopters of GAPs adopt and sustain GAPs practices, although, they could not sell their GAPs products with high premium (They sell like conventional product).The environmental factors (protection of soil, plants, livestock/animals and water) were also the most effective factors that induced farmers to adopt GAPs and most of the adopters of GAPs have a greater environmental concern and tendency. Health factors (protection of himself, his family, his employees and his consumer health) were also effective factors. GAPs encourage farmers to produce food that is not only wholesome (promoting good health and well-being) and nutritious, but also safe. Adopters of GAPs take great pride in growing high quality, nutritious fruits and vegetables and would never knowingly produce food that could harm their customers. Foodborne illness that can be traced back to farms happen, and incidents each year in many countries.

Adopters of GAPs need most the information from educational extension. Educational extension was means of providing training and service to adopters of GAPs. Know-how (input and method) also was one of the important information needed by adopters of GAPs. This implies that there was a need for technical information. Technical information is the information about land preparation, seed selection, planting, and harvesting. The marketing information is information needed by adopters of GAPs. Access to marketing information by adopters of GAPs, it helps them to know the situation of the market. This information influences the decision making of adopters of GAPs. If the adopters of GAPs had information about the situation of the market, that the market needs more supply, then they can decide to produce more and meet the supply requirement.

Conventional farmers misuse fertilizers and pesticides for the farm and that misuse, mostly caused environmental and soil problems. To be a conventional farmer, it means to do whatever makes your farm more productive and not caring of the production of food that is safe and has quality. It indicated that conventional farmers were more depending on use of fertilizers (chemical fertilizers) and synthetic pesticides. Those were the reasons to reject adoption of GAPs. Another most effective reason to reject the adoption of GAPs was believed that it was impossible to produce without fertilizers. These farmers were accustomed of using fertilizers and pesticides. They need to get more information about GAPs.

7.2 Recommendations

The use of GAPs contributes to adopters to obtain healthy and good quality food to assure their nutrition and nourishment, generating value added in their products to access markets in a better way. Consumers of adopters GAPs will enjoy better and safe, quality food, with sustainable production. The population in general, that will benefit from better environment. GAPs fosters improve of the farmer and consumer conditions, enhance the agricultural family welfare, improve food security, healthy food, not contaminated and of higher quality to improve nutrition and food consumption. It also fosters no contamination of water and soils, rational handling of agro-chemicals and concern about biodiversity, animal care and adequate feeding. At harvesting stage, they also contribute to adopters of GAPs that the harvesting staff must have clean hands, short nails, tied hair and no smoking nor drinking the harvest. At the fruit trees, no fruits should be collected from the ground.

Study results indicated that the information sources like a district agricultural manager/personnel, union adviser of the farmers' union (GAPs) and pesticides/fertilizer dealers were preferred the main source of agricultural information for adopters of GAPs. However, it recommended that information sources like research institute, university and cooperatives needs to be improved by strengthening their way of information dissemination.

The pesticides/fertilizer dealers to be one of the main sources of information for adopters of GAPs were not recommended because these dealers utilize their information to disseminate and make better thing the fertilizers and pesticides they sold. It recommended also the adopters of GAPs increase their membership of farmers' organizations because these organizations disseminate and share the useful information required by adopters of GAPs.

The study results also presented that the useful information from other farmers, local chambers of agriculture (TZOB), cooperatives, television/radio, research institute/personnel, and internet were not benefiting properly by adopters of GAPs. It recommended that agricultural policy makers in the government should ensure programs to promote the utilization of information from television/radio, internet and local chambers of agriculture (TZOB).

Finally, it was found that conventional farmers (non-adopters of GAPs) had some reasons to reject the adoption of GAPs. They had reasons like do not know what about good agricultural practices (GAPs, they thought also that zero use of drugs and medication was not possible. Others thought that the use of good agricultural practices (GAPs) was not profitable. It was recommended that to increase the awareness and information access about the importance of good agricultural practices (GAPs) for conventional farmers. Conducted seminars about good agricultural practices for conventional farmers were also recommended.

AKIS can diffuse the GAPs practices to adopt more producers. Using by AKIS system, it can fill the communication gap between GAPs facilitators and conventional farmers. The AKIS concept depicts knowledge as part of the "triangular institutional arrangement' involving three major factors of research, education, and extension, whereby farmers are placed at the center of the triangle. This provides GAPs facilitators to reach conventional farmers and persuade that the use of GAPs can improve their food safety, quality, and increase their production. It can also improve the health of themselves.

In terms of the usefulness of AKIS for this study, it seems that this system approach was insufficient to analyze this study. Even though this system functions are essential elements, they are insufficient for establishing a network of complex innovation-oriented institutional arrangements. In the future, this study suggests that to analyze with network analysis GAPs it needs to use Agricultural Knowledge and Innovation System (AKIS), because this system have many interaction networks that can facilitate to reach the innovation quickly to the allocated farmers.

The low sample size was one of the challenges of methodological implication of this study. In the future, this study suggests that using of enough sample size can contribute to get better results. The language barrier was also one of the limitation during data collection. Although they welcomed me in a good manner, the inhabitants in Bafra district, mostly they are middle and old age farmers. In spite of time and facilities limitation, It took more time to explain our objectives, and why we selected for them to do this research.

The size and scale of a farming operation, number of years of operating experience, the demographics of the surrounding region, and the preferences of the farmer will determine which channels are best suited to the farming operation. However, adopters of GAPs use direct marketing, selling a product directly to the end user (consumer) and they could not sell their GAPs products with high premium (they sell like conventional product). The reason they used this kind type of marketing channel was because of the lack of special market for producers of GAPs products. Bafra Vegetable Producers' Union expected in the future that GAPs producers will get special markets that encourage them to increase their products and also continue the practice of GAPs.

The following future research areas can also be recommended:

a. Empowering and increasing awareness on agricultural information sources such as internet, television/radio and other media for adopters of GAPs.
b. Research on strengthening the marketing information required by adopters of GAPs.
c. Research on increasing the utilization of information sources from other farmers, conducted demonstrations and trials of good agricultural practices (GAPs) for conventional farmers.

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APPENDICES:

1. QUESTIONNAIRE

ONDOKUZ MAYIS UNIVERSITY

INSTITUTE OF SCIENCE

DEPARTMENT OF AGRICULTURAL ECONOMICS

THESIS PROJECT QUESTIONNAIRE

Project Name: The Comparison of Agricultural Knowledge and Information Systems (AKIS) for Adopters and Non-Adopters of Good Agricultural Practices (GAPs) in Bafra District of Samsun, Turkey

Project Manager: Mustafe Abdulkadir Abdurahman

Supervisor: Associate Prof. Dr. Kurşat DEMİRYÜREK

Questionnaire No:

Date:

Province: Samsun District: Bafra Village:

Questionnaire Maker**:**

SECTION 1: PERSONAL INFORMATION

1. Farmer's Name and Surname: …………………………….. 2. Farmer's Age: ……
3. Educational Status: ………………….. 4. Number of Persons in the Family …….
5. Agricultural Experience (year): …………………….
6. Good Agricultural Practice (GAP) Experience: ………….
7. The Number of People Working in The Farm:
   Family's working persons: ……. Temporary workers: …… Permanent workers: …...
8. Are you registered to the farmer registration system? a) Yes ( ) b) No ( )
9. Do you have a membership to any social security institutions?
   a) Yes (Please specify: SGK, BAĞKUR, Yeşil Kart, Özel sigorta, others) b) No ( )

10. How much of your total annual income is comprised of agricultural activities (%)?

    Source of income (%): Agriculture: ……

    Off-farm (Please specify: employee, government employee, merchant, supervisor, pensioner, input dealer)

11. Table: Agricultural organizational membership status

	Membership form*	Satisfaction status**	Benefit services***	Reason to be a member****
Bafra rice producers' association				
Bafra vegetable producers' association				
Local Chambers of Agriculture (TZOB)				
Irrigation Union				
Agricultural Sales Cooperatives				
Agricultural Credit Cooperatives				
……. Association				
Cattle Breeding Union				
Other ………				

*****0: Not a member, 1: Normal, 2: Director, 3: Chairman

**1: Not at all satisfied, 2: Not satisfied, 3: Undecided, 4: Satisfied, 5: Overjoyed

*** Providing input, Counseling, Education, Credit, Certification, Marketing, Record-keeping, and etc.

**** Reason not to be a member: No Organization, Unnecessary, I do not know, Useless, Considering participation and etc.

SECTION 2: FARM PROPERTIES

12. In general, geographical location and size of the good agricultural practices farms (da= decar)

Total of flat land ………. da, Total of slope land …….. da

Number of pieces for farming land ……….. number

13. Farm size and land ownership format (1 da = 1000 metric square)

Land usage	Area (da)	Land usage	Area (da)
1. Land using by the owner		4. Land giving for common users	
2. Land holding for common users		5. Land giving for rent	
3. Land holding for rent		6. Total farm land	

14.1 Livestock products

Type	Bull	Middle-bull	Cow	Middle-cow	Calf	Sheep	Chicken	Beehive
Number								
GAPs or Conventional								

14.2 Vegetable products

Name of the product	GAP or Conventional	Open or Closed land (Greenhouse)	Area (da)	Amount of the product (kg/da)	Selling amount (kg)	Selling Price (kg/TL)	Product Marketing place (Product Union, GAP company, Cooperatives, Government, Merchant, Other)

SECTION 3: GAPs INFORMATION AND KNOWLEDGE SOURCES

Source of Information	Frequency of relation (Last year)	Topics	Usefulness Status	Reason for no relationship
1. Family members				
2. Other farmers				
3. Union adviser (GAPs)				
4. Union chairman (GAPs)				
5. Certification inspector				
6. GAP company personnel				
7. District manager/personnel				
8. Research Inst./personnel				
9. University/research				
10. Special freelance consultant				
11. Private Veterinarian				
12. Pesticide/fertilizer dealers				
13. Cooperatives				
14. Local Chambers of Agriculture (TZOB)				
15. Agricultural Bank				
16. Technical books, magazine				
17. Newspaper article/news				
18. Leaflet/booklet				
19. Television/radio				
20. Internet				
21. Course/conference				
22. Meeting (GAP)				
23. Demonstration/trial				
24. Scientific conferences/panel				
25. Others (please specify)				

*Frequency of relation: everyday, 2-3 days per week, 1 day per week, 2-3 days per month, 1 day per month, 4-5 days per year, 1 day per year, never

**Usefulness status: (VU) Very Useful, (U) Useful, (UD) Undecided, (LU) Less Useful, (UL) Useless

*** Reason for no relationship: Does not come, Remote, Not interested, No need, Information is insufficient, Unhelpful work intensive, Not be organized, I do not know, Location is not appropriate and etc.

15.1 Who are the most talked 2 persons/organizations about good agricultural practices?

No.	Name	Meeting frequency*	Usefulness status**
1.			
2.			

*Meeting frequency: Everyday, 2-3 days per week, 1 day per week, 2-3 days per month, 1 day per month, 4-5 days per year, 1 day per year, never

**Usefulness status: Very useful, Useful, Less useful, No useful

15.2 Who is the person that gives you advice on good agricultural practices?

No.	Advisor	Meeting frequency*	Usefulness status**
1.			
2.			

*Meeting frequency: Everyday, 2-3 days per week, 1 day per week, 2-3 days per month, 1 day per month, 4-5 days per year, 1 day per year, never

** Usefulness status: Very useful, Useful, Less useful, No useful

15.3 Have other farmers contact you to get advice on good agricultural practices?

No.	Advice taker	Meeting frequency*	Usefulness status**
1.			
2.			

*Meeting frequency: Everyday, 2-3 days per week, 1 day per week, 2-3 days per month, 1 day per month, 4-5 days per year, 1 day per year, never

** Usefulness status: Very useful, Useful, Less useful, No useful

16. What are the GAPs or GAPs related company services that GAPs farmers utilized? Please specify:

(Credit, fertilizer, drug, seed supply, counseling, education, certification, record-keeping, marketing and others)

…………………………………………………………………………………………

Benefit status of good agricultural practices support:

a) Yes, I am benefiting
   - (   ) Additional direct income support (….TL)
   - (   ) Certification support (….TL)
   - (   ) Farm credits with discounted interest (….TL)
   - (   ) Environmental Friendly Protection Program for Agricultural Land (ÇATAK) support (….TL)
   - (   ) The use of bumblebee (beekeeping) support (….TL)
   - (   ) Organic agriculture and good agricultural practices support (….TL)

b) No, I am not benefiting good agricultural practices support:
   - (   ) I do not know good agricultural practices support
   - (   ) I find insufficient and I did not need
   - (   ) I have a problem with the legislation
   - (   ) Other (Please specify): ………………………………………….)

17. Is there agricultural insurance for products that you are produced?

	Product, livestock	Insurance company/ person	How much insurance costs do you use?
I use insurance			
I do not use insurance			reason:

18. Is there a certification of good agricultural practices for products that you are produced?

Product	Certificate company/organization	Cost (TL/da)	Who pay the cost

19. What kind of information do they need adopters of good agricultural practices?

The type of information	Too much	Much	Some	Few	No
Know-how (Input and Method)					
Legal official regulations					
Price					
Private adviser					
Educational extension					
Own experience					
Diversification of production					
Private consultancy gardener					
Marketing					
Subsidies					
Others Please specify:					

20. Farmers Information Usage Situation

How do you apply innovation (New fertilizer, new pesticide, new machine and new technical method) that you hear or saw?

Give a note to the appropriateness of each of the following statements.

(0 do not fit me at all, 1 fit me less, 2 fit me some, 3 often fit me, 4 fit me full)

(….) I would apply directly the knowledge and innovation that I hear from an expert.

(….) I would apply innovation after testing and seeing its usefulness.

(….) I would apply innovation after changing a little bit, because my working conditions are special for me.
(….) I would apply innovation after other farmers tested and it becomes successful.
(….) I would apply after consultation with experts or knowing innovation.
(….) I would apply information related to my own experience and existing applications.
(….) I would meet all information that I need.
(….) Others please specify ………

GAPs AWARENESS, DECISION MAKING, APPLICATION AND ABANDONMENT

1. What do you understand the concept of good agricultural practices? Define:

………………………………………………………………………………………
………………………………………………………………………………………
……………………………………………………………………………………

2. Good agricultural practices where first heard/person:
   ………………………………………………………………………………………
   ………………………………………………………………………………………

3. Where/person learning from principles of good agricultural practices:
   ……………………………………………………………………………

4. Factors effected on adoption of good agricultural practices (GAPs and last season producers)
   (Please rank in order of effectiveness: 0 it was not effective, 1 least effective, 5 most effective)

   (….) Environmental protection factors (protection of soil, livestock/animals, plants and water)
   (….) Innovation (trail request for new and different things)
   (….) Economic factors (premium prices, purchase guarantee, supports, save costs, profitability and etc.)

(….) Social factors (company, union, other GAPs producers support and etc.)
(….) Health factors (protection o himself, his family, his employees and his consumers' health)
(….) Others please specify: ………………………………………………

5. Reasons for rejecting the beginning of good agricultural practices (for conventional farmers)
(Please rank in order of effectiveness: 0 it was not effective, 1 least effective, 5 most effective)

(….) do not know (….) not profitable (….) less than premium price
(….) not without drugs/medication (….) not without fertilizers
(….) they did not invite (….) low yield (….) inadequate labor
(….) no government support (….) insecure company (….) insecure traders
(….) lack of capital (….) owed to the merchant (….) barrier property owner
(….) family objections (….) others please specify …………………………

6. Reasons for giving up good agricultural practices (for GAPs give up producers)
(Please rank in order of effectiveness: 0 it was not effective, 1 least effective, 5 most effective)

(….) do not know (….) not profitable (….) less than premium price
(….) not without drugs/medication (….) not without fertilizers
(….) they did not invite (….) low yield (….) inadequate labor
(….) no government support (….) insecure company (….) insecure traders
(….) lack of capital (….) owed to the merchant (….) barrier property owner
(….) family objections (….) others please specify …………………………

GOOD AGRICULTURAL PRACTICES WITH NEW INNOVATION

1. Fertilizer use:
    a. According to the results of soil analysis
    b. According to my experience
    c. After adoption of GAPs the fertilizer use <u>decreased</u>
    d. After adoption of GAPs the fertilizer use <u>increased</u>
    e. After adoption of GAPs the fertilizer use is <u>not changed</u>
    f. Ask who he asked which fertilizer does he use ……………………

2. Drug use:
    a. According to my experience
    b. I totally take the advice from the GAPs adviser
    c. I mixed my knowledge with the advice from the GAPs adviser
    d. After adoption of GAPs the drug use <u>increased</u>
    e. After adoption of GAPs the drug use <u>decreased</u>
    f. After adoption of GAPs the drug use <u>is not changed</u>
    g. Ask who he asked which drug he uses to which plant ……
    h. Ask who he asked which plant and how much drug does he use……
    i. Do you have a place for drug preparation and storage?
       Yes (   ) No (   )
    j. Do you take precautions during drug preparation and application?
       (   ) Yes, Please specify ……………………………………………….
       (   ) No, Why …………………………………………………………..
    k. Do you use residue analysis for products you produce as GAPs products?
       (   ) No   (   ) If yes, who is doing …………………………….
    l. Residue analysis for all products is it to be done?
       (   ) Yes; ………………………………………………………
       (   ) No; ………………………………………………………
    m. Empty drug box:
       (   ) Throw to the field
       (   ) I would dispose of the appropriate procedure; How ……………

3. Is there a bathroom for the use of workers in your field?

a. No; ……………………………………………………………………

b. Yes; ……………………………………………………………………

c. Did you have not made according to the GAP, should be even toilet in your land?

   Yes ( ) No ( )

4. Do you do contract farming?

a. No; ……………………………………………………………………

b. If yes; which traders/firms …………………………………………

PROBLEMS AND COMMENTS

1. Problems

Please indicate the extent of the problems you are experiencing with regard to good agricultural practices and institutions.

Type of problem	Too much	Much	Middle	Little	No
1. Lack of information support: • From the district directorate • From research institute • From university • From agricultural organization • From GAPs union • From GAPs adviser • From GAPs certificate inspector • From private organization (specify)					
2. Lack of warehouse storage conditions					

3. High production costs					
4. High input costs					
5. Disease and pest problems					
6. Lack of labor					
7. Low yield					
8. Insufficient government support					
9. Low price of the product					
10. Past debts from traders					
11. Disputes between farmers					
12. Marketing problems					
13. Lack of organization					
14. Others (please specify):					

2. Farmers' Comments

2.1. What do you think should be done to solve these problems? What would you recommend activities and services for the development? Please specify:

………………………………………………………………………………………

………………………………………………………………………………………

……………………………………………………………………………….

2.2. Is there anything else you wish to say about the activities of the agricultural support organization? Please specify:

………………………………………………………………………………………

…………………………………………………………………………

2. CURRICULUM VITAE

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