Rural Informatics for ASEAN Agribusiness Transformation
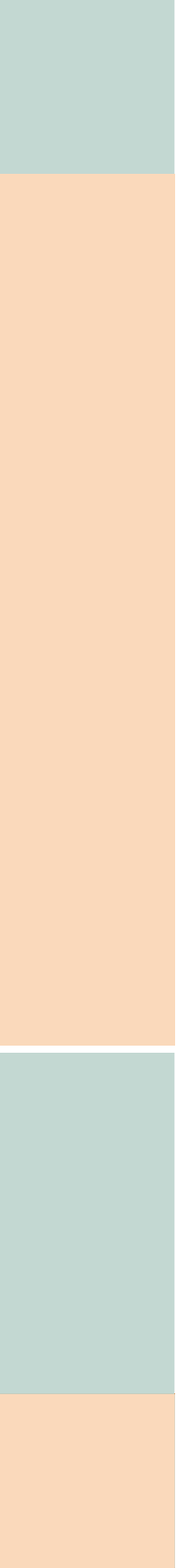
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Preface

In acknowledgement of the significance of Information and Communication Technology (ICT) as a key factor for the development of agribusiness particularly in rural areas. This book, Rural Informatics for ASEAN Agribusiness Transformation, is the collection of extensive research in the field of Technology Management.

This book illustrates how technology strategies work in the agricultural sector. For example, Information Communication Technology (ICT) does not just provide information to people in agribusiness. It also helps people in agribusiness connect with one another. Instead of applying latest technology to agricultures supply chains, this book begins by explaining the structure of agricultural business in the ASEAN region. Then, provide examples of how Information Communication Technology (ICT) is a mechanism that create impact on how farmers, collectors, middlemen, exporters, government officials working together in exchange data, information on price, production volume, quality, harvest time, buyers, and etc. As a result, agricultural output can be more profitable by lowering production and logistics costs, better planning, and higher quality goods.

Information and Communication Technology (ICT) is the main technology discussed in this book in order to illustrate the right point of view about how technology should be used effectively. Many times, people put too much emphasize on technology than how it should be used. Multiple examples in the following chapters demonstrate how we can get the most from the technology and how technologies can help those in the agricultural supply chain maximize their ability to improve agricultural production process for getting the best results.

Chapter One

Rural Informatics for Agribusiness in ASEAN Economic Community (AEC)

Introduction

Information and Communication Technology (ICT) has developed as an effective facilitator in the growth in any culture across the country and as a major driving strength in the progress of economies globally. ICT can deliver farmers with direction on where and when to propagate, harvest, process, and market their produce to avoid having to offload their goods at throw-away prices in the local markets, and buyers can use ICT to regulate dominant market prices. ICT will cover the way for negotiation among researchers, and farmers in rural communities. ICT plays a dynamic role in the area of rural informatics for agribusiness development in the ASEAN Economic Community (AEC).

Agriculture is the pillar of e-ASEAN economies it occupies an essential position in the progress of all ASEAN members. According to the e-ASEAN Initiative, ASEAN countries must embrace ICT, its development and use, if they are to sustain economic growth and remain competitive in the global marketplace. Toward this end, the ASEAN leaders have agreed to promote collective efforts to complement national development strategies in this sector. The ASEAN initiative establishes a region-wide approach to making comprehensive use of information and communications technologies in business, society and the government.

According to ASEAN ICT Masterplan 2015 (ASEAN, 2011), ICT will become an engine of growth for ASEAN. ASEAN will be a global ICT hub and the quality of life of our people will be enhanced. Most importantly, it will pave the way for a more integrated ASEAN as one community.

What is Information Communication Technology (ICT)?

As the full measurements of the changes commenced by Information and Communications Technology (ICT) has become more generally implicit, the means by which these might be combined into and improve the prospects in such areas as "rural development" have begun to come to the forefront. Thus, Agribusiness development especially in rural areas embraced the ICT to become more productive.

When thinking about Information Communication Technology (ICT) it is good enough to consider all the usages of digital technology that already exist to help individuals, businesses and organizations use information. ICTs are those technologies that can be used to link information technology devices such as personal computers, telephones and mobile phones to their telecommunication networks. The personal computer and laptop with email and Internet provides the best example. Michiels and Van Crowder (2001) have defined ICTs as "a range of electronic technologies which when converged in new configurations are flexible, adaptable, enabling and capable of transforming organizations and redefining social relations." The range of technologies is increasing all the time and "there is a convergence between the new technologies and conventional media" (Michiels & Van Crowder, 2001).

This fast and continuing junction means that devices such as digital cameras, digital video cameras and players, personal digital assistants, slide projectors and mobile telephones are also compatible with more traditional media such as radio (digital, satellite), television (cable, digital, satellite). Thus most devices can now be connected to others to share and exchange information and allow it to be used in such a way that they can also be categorized as ICT. Even books are being combined into ICT either through the potential for informal web publishing or more formal digital book publishing with designated readers or "e-books." ICT, therefore, is an increasing gathering of technologies that can be used to gather, store and segment information between people using numerous devices and several media.

The term ICT can be interpreted as including a wide range of me-

dia, new ICT is used to denote "the use of computers and commu-
nication systems between computers" (CTA, 1999, p. 4). The new
ICT is becoming more accessible, and users can obtain information
from various sources, and one computer could meet the needs of
a large rural community. A CTA seminar on "The Role of Infor-
mation for Rural Development in ACP Countries that are African,
Caribbean and Pacific Group of States" concluded that "these mod-
ern technologies offer new and multiple perspectives, such as faster
and better-focused access to information" (CTA, 1998, p. 13). Elec-
tronic mail is the most commonly used new ICT and has caused a
cultural revolution in the way individuals and organizations inter-
act, in terms of time, cost and distance. The second most significant
use of new ICT is the World Wide Web, which enables people to
access information on millions of other computers.

The Development of Rural Informatics

Over the last decades Information and Communication Technology
(ICT) have been progressively and with excitement recommended
as a indicates of changing creating nations in contemporary; in-
formation centered culture and to relieve some of the public and
financial issues of third world, particularly those in rural areas. Yet
very little is known about the legitimacy of these aspirations, much
less about the long-term social and economic effects of these tech-
nologies upon societies both in urban and rural areas.

Rural informatics focuses on the relationships among Informa-
tion and Communication Technology (ICT), growth, knowledge and
humanity. Transforming information into useable strategy neces-
sary for decision-making and the significant skills to improve their
livelihoods. To bring forth the full blast of rural informatics devel-
opment; researchers, scientists, technology developers and design-
ers, policy makers, development organizers, practitioners, teachers,
and community leaders with a concern for information technology
work together to meet the challenges involved in bringing technolo-
gies to individuals and vice versa.

Dhingra and Misra (2001) cited in their work for rural informat-
ics, that National Informatics Centre introduced Information Tech-

nology (IT) in Rural Development (RD) sector in the year 1986 and since then the three entities have been going hand in hand leading to the evolution of Rural Informatics in India. It is worth mentioning that induction of IT in rural development and its subsequent evolution have not been easy tasks, owing to the unstructured nature of rural development domain, slow pace of development reforms, low IT literacy and reluctance to adopt IT. Nevertheless, Rural Informatics has reached a stage today where IT finds a significant place in rural development, not only in terms of the expanse and magnitude of its application but also in terms of technological advancement.

Emergence of Rural Broadband for Agribusiness

Suparerk (2012) defines the structure and scope of advanced broadband-enabled ICTs differs fundamentally from traditional voice-oriented telecommunications. "Broadband" as a term of art implies not merely speed or capacity of network data transmission, but a wide array of capabilities, services, and applications, as well as technology configurations and platforms, all of which depend upon high capacity inter connectivity among all components. Providing high speed internet to the farm benefits the agribusiness owners and workers can access the Online from the devices, seeking instant reviews from a mobile phone or personal digital assistant (PDA) on devices issue, property lines, market costs, predicting the weather, tracking investment costs. In addition to receiving information, high-speed internet access is necessary for farm owners being able to share their tale and products with the world through weblogs, websites, video clips, and social networking sites like www.farmsphere.com, etc.

Global Positioning System (GPS) and Radio-Frequency Identification (RFID) technology is merely a fragment of how farm owners can implement technological innovations to improve company procedures. From knowing shipping places and fuel expenses to monitor product places and distribution times, farm owners can implement a bit more control over the entire farming process from farmer through end users. Interesting, but just how useful high speed inter-

net will be to the agribusiness is determined by the company itself.

However, there are people believe that high speed internet effectiveness to the agribusiness is far from being identified or achieved, but the intent is to offer farm owners with the equipment to relocate their company's potential and allow them to expand technological innovation advantages into the area.

Rural Informatics for Agribusiness

In today's environment, information is the key to everything. A little planning can make a big difference for people in the agribusiness industry. It is very important that farmers, harvesting collectors, middlemen, exporters, and government officials working together in order to use the necessary information to arrange better supply chain and create a social network that keeps stakeholders in constant streaming contact with one another.

When information is needed, information and communication technology (ICT) has become an essential technology that not only uses for managing information but also have to comply with business strategy. The success of ICT project depends on how the project is being managed. For big corporations, managing ICT project requires major expenditures, staffs who understand the complexity of business and how it links with marketing, sale, human resource, manufacturing strategy, risk management, and finance. ICT is aimed to put to use the substantial information for better decision making. For people in rural area who may only have a small business, self-employed, work in a factory, or just being a farmer, ICT can become a holistic system that can support common request, things that happen around them, information that can help them make better decision and have a better life.

The purpose of rural informatics is to engage very seriously about how small-scale farmers can enhance their competitiveness through the use of information technology that can increase agribusiness supply chain effectiveness, better rural livelihoods, and participate in the changing market condition. When participating in rural informatics becomes a social process, a social network will happen.

The idea behind networking is to exchange information and knowledge, increase collaboration, help solve common problems, and strengthen relationships of people who have participated in the network. The success of the network is usually based on people, not an organization. Successful network can transform to a bigger network call cluster which is a network in the same geographical concentration of enterprises that produce and sell a range of related or complementary goods and are thus faced with common challenges and opportunities.

Although many organizations have come to accept that the concept of clustering and networking are very important for enterprises which produce and sell a range of related goods in order to increase the collaborative work among stakeholders in the value chain. Developing a cluster strategy is not an easy task especially for the agriculture business. There are three key issues that will drive the development of cluster in the agricultural sectors. These include the development of synergies in order to increase the economies of scale, intervention of external agents such as the government or non-government organizations (NGO), and finally the information technology that will link, support, and integrate these activities.

For ICT strategy, Achieving ICT strategy and business model that is suitable for the agriculture business in the ASEAN continues to be among the top concerns of many government and private sectors. To set up the ICT strategy, one must understand how ASEAN agriculture business worked. There are five groups of stakeholders in the agriculture business namely (1) supporting function, (2) producers, (3) middlemen, (4) distributors, and (5) retailers. The supporting function includes local stores that sell chemical products used in the plantation process, governmental sectors that provides know-how and assistant to the farmers, and non-government organizations (NGO) that usually concern about saving the environment and political development. The producers are ordinary farmers and the group of farmers that are part of the co-operative group. The middlemen are those who collected fruits and vegetables and sell them to the distributors, exporters, retailers. These middlemen can be local people who live in the areas or those who usually come

into the area during the harvest time. The distributors include exporters who set up the collecting sites in the areas and major buyers such as discount superstores and local restaurants that have buying contracts with farmers. The retailers are local merchants and some farmers who bring their own produces to the market and groceries by themselves.

The New ASEAN Economic Community (AEC)

During the past decade, The Association of Southeast Asian Nations (ASEAN) with ten member countries, namely, Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam has become one of a center stage of the world. ASEAN countries with China, Japan, and Korea, also known as ASEAN + 3, have transformed themselves to become the world's top producers of many products such as technology, automotive, electronic, and agricultural producers.

ASEAN has emphasized regional cooperation on the three pillars of socio-cultural, security, and economic integration. It has made more progress in economic integration and aims to create an ASEAN Economic Community (AEC) by 2015. The AEC has a population of approximately 600 million people and a gross domestic product of over $1.843 trillion (2011).

What are the Guiding Principles?

Figure 1.1 uses data from the World Economic Forum to plots Global Competitiveness Index rankings versus Gross Domestic Product (GDP) of ASEAN member countries. It indicates that while Singapore may have a very high score on competitiveness index the size of GDP is still small. On the other hands, Indonesia has the biggest GDP in ASEAN but its competitiveness is about 4.4 in the year 2011.

After plotting the competitiveness index and GDP of ASEAN + 3 with the United States and European Union (EU), figure 1.2 suggests that ASEAN + 3 quickly become one of the top group among the United States and European Union in term of competitiveness and GDP. Numerous factors have helped ASEAN + 3 to lead re-
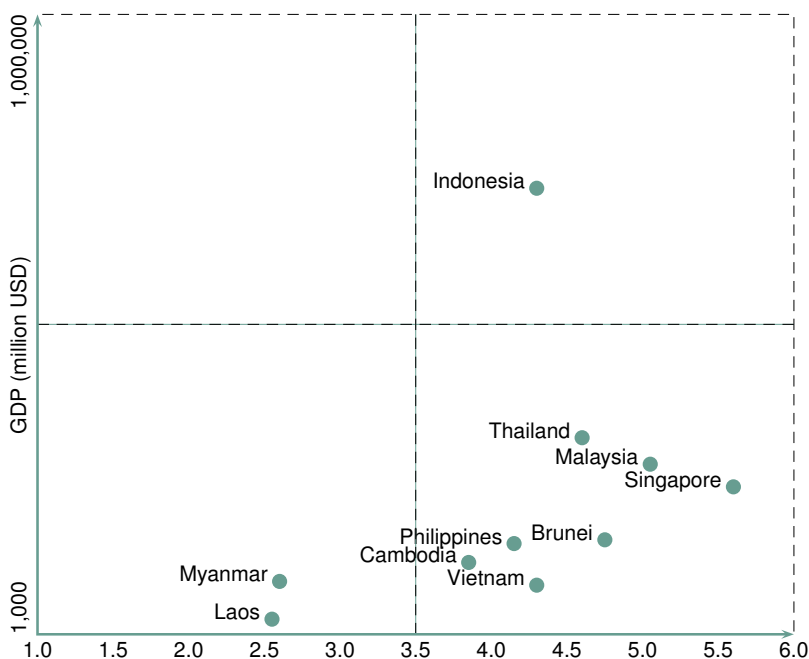
Figure 1.1 ASEAN Global Competitiveness Index Rankings vs. GDP (based on data from the 2011 World Economic Forum, http://www.weforum.org/gcr)

gion's growth in the coming decades. Today ASEAN + 3 are not only the factory of the world but also center of knowledge in Asia. The economy of ASEAN + 3 is almost the same size as USA and EU. If we include India and other Asia countries, the gap will be smaller. Perhaps, the Asian century is coming sooner than we have anticipated.

For all what ASEAN + 3 can do to the world in term of having factories that produce all kinds of products, ASEAN is among the world's top maker of food production. ASEAN is a nexus; for example, ASEAN is one of the world's largest producers of poultry, shrimp, animal feed, rubber, rice, etc. Agribusiness is big in ASEAN. However, ASEAN's farmers are still poor and need access to capital, know-how, markets, technology, and information for them to make better decisions.

In a period when information and communication technology
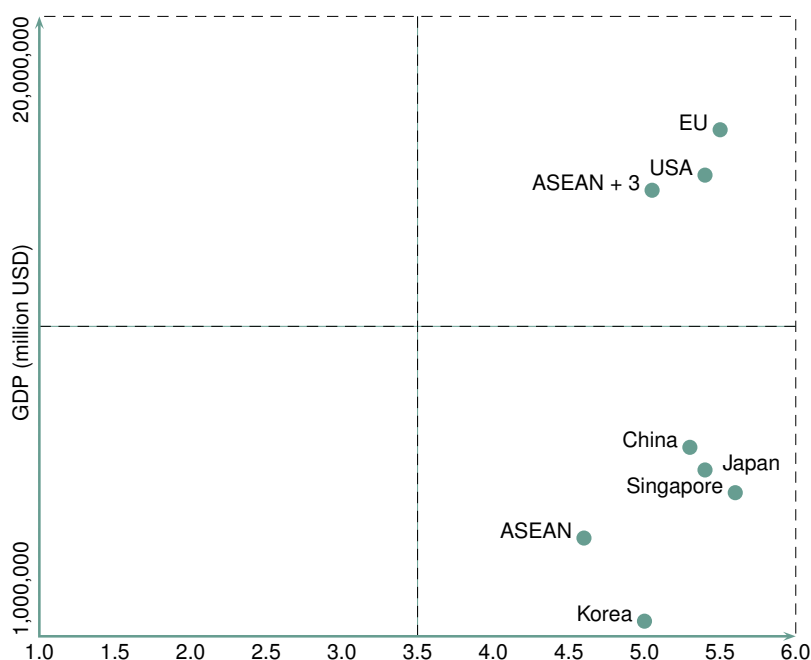
Figure 1.2   ASEAN + 3, USA, and EU Global Competitiveness Index Rankings vs. GDP (based on data from the 2011 World Economic Forum, http://www.weforum.org/gcr)

(ICT) is a tool that can help farmers and people who is working in agricultural sector see how their work can be more adequate. Information and communication technology has played an important role in improving the agribusiness process.

ASEAN submitted a joint statement to the World Summit on the Information Society, held in Geneva on 10 December 2003, which advocated the following: (1) the global strategy to realize the Information Society must be based on concrete milestones rather than broad visions; (2) the Plan of Action should be adapted to each region's unique and diverse needs; and (3) existing regional initiatives such as e-ASEAN should be leveraged upon when implementing ICT programmed. Figure 1.1 shows ASEAN Global Competitiveness Index rankings versus GDP. Figure 1.2 illustrates ASEAN + 3, USA, and EU Global Competitiveness Index rankings versus GDP.

Towards an Empowering and Transformational ICT

It has been acknowledged will continue to be the driver in all aspects of all nation building in the next few decades, similar to other regions, ASEAN is poised to embrace the future riding on the wave of innovation and technology that has brought wealth and prosperity in this region in the last ten years. How we steer out ICT development over the next five years will greatly impact ASEAN, especially in the lead up to this region becoming an Economic Community in the year 2015 (ASEAN, 2011).

The ASEAN Telecommunications and ICT Ministers (TELMIN) have come together to chart the approach towards ICT development in the next few years. This needs to be done in an integrated manner to support the other sectors of the economy (ASEAN, 2011).

The TELMIN has taken over the technological aspects of the e-ASEAN work program from the auspices of the ASEAN Economic Ministers. The Telecommunications Senior Officials Meeting (TELSOM) Working Groups are carrying out the four objectives of the e-ASEAN Framework Agreement, namely (1) to develop, strengthen and enhance the competitiveness of the ICT sector; (2) reduce the digital divide within and amongst ASEAN Member Countries; (3) promote cooperation between the public and private sectors; and (4) develop an ASEAN Information Infrastructure (ASEAN, 2003).

Summary

Information and Communications Technology (ICT) has massive prospective in empowering agribusiness development. Its usage in agriculture sector is progressively essential. Thus, ASEAN Economic Community (AEC) agricultural sector embraced and acknowledged the Information and Communication Technology (ICT) importance as a key drive for rural agribusiness development.

The key emphasis on ICT in agriculture is meeting the farmers' requirements for information. And this information is very radical in decision making in order to continue to produce profitably.

The vital drive of rural informatics is to involve extremely

on how small-scale farmers can improve their effectiveness through the usage of information technology that can increase agribusiness supply chain value, enhanced rural incomes and contribute in the varying market situation. When sharing in rural informatics develops a social progression, a social network will occur.

Chapter Two

Cluster Modeling for Agricultural Sectors

Introduction

At the time of the last 2−3 decades, cluster approach has pinched significant attention from policy makers, legislators, business leaders, academics, economic development practitioners and development agencies etc. The cluster is an extensive concept rather than an accurate term. A cluster comprises of practices and linked economic actors and organizations that lure dynamic benefit from their common contiguity and networks.

The Agriculture Cluster brings together stakeholders working in the agriculture sector in the ASEAN Economic Community (AEC). A variation of Cluster models has been embraced by numerous countries conferring to their necessities. Mutual requirements and interests, inter-reliant and overlying, capacity and ingenuity, and novelty are the necessary ingredients for developing a cluster. Cluster development is also transforming business, encouraging economic growth and growing efficiency across the globe. Clusters are successfully employed in the agriculture sectors in the ASEAN Economic Community (AEC).

Cluster modeling delivers firm with contact to more providers and particular livelihood services, knowledgeable and expert industry pool and the predictable information outflow that happens where people encounter and dialogue about business. The cluster approach is not merely about consolidating or developing individual companies or organizations within a specific industry rather it is about structuring that industry as a total so that it is stronger, appropriate and prepared to take benefit of what the imminent brings. By evolving an arranged approach for expansion, the entire sector will be improved placed to recognize and take gain of the prospects that co-operation can convey.

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What is Clustering?

Through setting up a cluster, stakeholders in the agricultural sector can address not only local problems but also regional problems as well. Clustering can improve the competitive position of people in the agricultural business in the Greater Mekong Subregion (GMS).

A cluster is a grouping of similar things. This definition was not able to define the context of any particular study. Many definitions of the cluster have been defined. The most popular definition is probably from The United Nations Industrial Development Organization (UNIDO) which has started the cluster development program since 1995. UNIDO defines a cluster as a sectorial and geographical concentration of enterprises that produce and sell a range of related or complementary goods and are thus faced with common challenges and opportunities (Hobohm 2002). The cluster approach has been strongly supported by UNIDO in many developing countries in order to promote the network of small and medium-sized enterprises (SMEs).

Cluster development has been introduced throughout the world. Nadvi (1995) reports the case study of small and medium-sized enterprise growth and innovation in developing countries such as Brazil, India, and Mexico. Pyke, Beccattini, and Sengenberger (1990) record the inter-firm co-operation case in Italy. Mytelka (2004) examines the relationship of long distance partnerships pursued by small and medium-sized enterprises in the biotechnology sector in France. However, most of cluster literatures do not examine agricultural sectors, especially in the Asean Economic Community (AEC).

Tambunan (2009) explained that the most important benefits of clustering were; low transaction costs Inter-organizational trust is likely to enhance collective learning when it encourages the sharing and disclosure of organizational information and knowledge, and reduces transaction costs. Its lower production cost-cluster members are able to reduce costs and to improve the level of service to their customers, even though transportation and communication costs decline (Karaev, Koh, & Szamosi, 2007; Carpinetti, Galdamezand, & Gerolamo, 2008).

Importance of Networking in Developing Cluster

Humphrey and Schmitz (1995) took the evidences from both developed and developing countries that clustering and networking helped small- and medium-sized enterprises (SMEs) to raise their competitiveness. Clustering and networking activities are relationship-based activities that support sharing and development of competences, knowledge and methods. The network concept is often introduced to characterize the specific forms of governance based on social relations, trust and the sharing of complementary resources that typifies many regional clusters (Vatne & Taylor, 2000). Social relations are seen as the most important channels through which information flows, and geographical proximity facilitates the formation of trustful social networks.

Scenario of Greater Mekong Subregion (GMS) Cluster Modeling for Agriculture

Today, more than half of the population in the Greater Mekong Subregion (GMS), six states of the Mekong River basin are Cambodia, Laos, Myanmar, Thailand, Vietnam, and the Yunnan Province of China, is in the agricultural sectors. The size of the farmer's family has decreased within the last decade. Children in agricultural family are spirited to set up their own family, working in the cities, or sell out their properties. Therefore, those who remain in the agribusiness are now having the smaller lot size of land to use in farming and raising of livestock.

In the agriculture sector, volume of crops that each farmer can produce play an important role in term of determining how much money they can make selling the agricultural produces. For example, the farmers in the same area receive the order of five hundred kilograms of cabbage per day from the local supermarkets and restaurants. In order to fulfill this order, the collector must contact five farmers who grow cabbages. Each farm can produce the cabbage per day as follows: Farm A can produce one hundred and fifty kilogram. Farm B can produce one hundred and thirty kilogram. Farm C can produce one hundred-kilogram. Farm D can produce eighty kilogram. Finally, farm E can produce sixty kilogram. The

amount of cabbage available to sell from five farms is five hundred and twenty kilogram—twenty kilogram over the request from local supermarkets and restaurants.

This brings us to the question which farm should be the one cutting out the twenty kilograms of extra cabbage. Assuming farm A, B, C, and D want farm E to sell only forty kilograms to the buyer because farm E has the smallest amount of cabbage pitch in to this order. What will farm E do with the rest of the cabbage (i.e., twenty kilograms)? Who has the right to decide how and the amount of cabbage to sell? Nevertheless, farm E may not want to sell at all since the twenty kilograms they have left is too small to fill other orders. They may have a better chance selling the sixty kilograms to someone else and demand good prices for their crop.

Such an outcome in the above example would be discomforting not only for the farms but also for the buyers because buyers do not want to buy more than what they really needed. The buyers may agree to buy the entire crop; however, they will probably not going to pay the premium for the extra cabbage that they do not need. Consequently, the price of cabbage per kilogram may drop, and five farms have to agree on the same price. Without working together, none of the farms (farm A, B, C, D, and E) will be able to fulfill this order to the local supermarkets and restaurants.

The big question facing agricultural sectors in the Greater Mekong Subregion (GMS) is whether the farmers can develop a network strong enough to be able to increase the bargaining power, overcome common problems, achieve gathered efficiency, and win markets beyond their single reach. Thus, networking among stakeholders is very important for developing a cluster in the Greater Mekong Subregion (GMS).

The Development of Synergies

Today, networking issues are becoming increasingly prevalent in the agricultural sectors in the Greater Mekong Subregion (GMS) for several reasons. First, this region is one of the largest exporters of agriculture products in the world, and one of a few countries that do have the surplus in agricultural produces. For example, Thailand

is ranked first in exporting rice to the world market. Thailand exports more than six million tons per year. The kingdom produces more than twenty million tons of rice per year and consumes only fourteen million tons. Vietnam is second. While the United States ranks third.

But most of farmers in Thailand and other countries in the Greater Mekong Subregion (GMS) still have little wealth and lacking specific resources and good quality of life. Indeed, we are seldom being able to demand a high price for our agricultural producers. What this means is that, major buyers or middlemen such as Taiwan or Singapore are usually be the one who sets the price for us.

So, while the reductions in the output of agricultural producers may increase the price of the goods. We must also work together in order to control the production level and passing the information along with each other. Next, information technology must be used in order to trace the activities and the change in the market situation of agriculture products from farms to consumers in the supply chain.

Working together requires trust and teamwork. The Greater Mekong Subregion (GMS) has the best environment for the agricultural sectors to work together. People in this region have a similar culture and producing similar agricultural produces. But, working together among the countries that produce generically similar agricultural produces do not occur easily because each country wants to develop his own strategies. They are after the same markets and customers.

The ways that the synergy will exist are to exploit interrelationship by creating a joint benefit program. The agricultural sectors in the Greater Mekong Subregion (GMS) need to build the interrelated cluster of agricultural produces. Each country should send a team to participate in this cluster in order to create networks and develop a common vision among suppliers, distributors, and buyers of agricultural produces. The group will act as liaisons and take a responsibility for creating a joint strategy to tackle the world market together. While much of the activity goes on in the network groups,

the activities are always under the supervision and influence of each own country's governmental policy. In this case, the common strategy within the GMS will be developed. By working together as a team, the GMS members can keep bidding the profit up because the Greater Mekong Subregion (GMS) members are betting on the same direction of the market and do not compete with each other.

Severino (2000) stated that the synergies between ASEAN and GMS programs of development thus offer immense potential for growth and profit. But governments can only put up the setting for business and investments to flourish. Business people are the real actors, giving substance to development, creating wealth out of our region's rich natural and human resources. The ASEAN Secretariat has the mandate to work closely with the private sector, listening to its views, working out its responses, including its complaints, and raising them with ASEAN's decision-makers.

The Intervention of External Agents

The integration among suppliers of agricultural produces in the GMS can generate positive outcomes for those who participated in the network. Moreover, many literatures (Schmitz, 1990; Nadvi, 1995; Dini, 1998) illustrate that the intervention of an external agent can greatly reduce the high transaction cost, increase information sharing, and reduce the risk of legal problems.

Businesses network is a group of firms with restricted membership and specific, and often contractual, business objectives likely to result in mutual financial gains. The members of a network choose each other, for a variety of reasons; they agree explicitly to cooperate in some way and to depend on each other to some extent. Networks develop more readily within clusters, particularly where multiple business transactions have created familiarity and built trust (Rosenfeld, 1995). Ties between firms in networks are typically more formal than in clusters (Feser & Bergman, 2000).

Joint objective is very difficult to build without any help from the government. The suppliers and producers of agricultural produces are often competing with each other. They have the tendency

of not trusting their partners. Therefore, the intervention from government subsidiary is very important in order to act as the coordinator to help increase the trust level, promote inter firm cooperation, reduce conflict, and boost private-public interaction. In addition, the government policy must be set to accommodate the network activities of stakeholders. For instance, a collector of agricultural producers in the area may take the cabbages to sell in the market with the estimate price of five baht (US $0.10) per kilogram. But when he arrives in the market, the cabbages only sell for four baht (US $0.08). If the government can provide the information regarding the standard price of the agricultural produces, it will help the farmers to understand the market situation and do not blame on a collector who takes their products to sell in the open market. That is the way that trust will increase, and more stakeholders will start working together creating a stronger network and raise the bargaining power for their group.

The Role of Information Technology Intervention of External Agents

The information technology is extremely important for developing clusters in the GMS agricultural sectors. Technology such as the Internet can provide data and share the information to policy makers, producers, middlemen, distributors, and buyers throughout the supply chain. Consider market signals as an example. The farmers in the developing country such as Bangladesh are start using the Personal Digital Assistant (PDA) in order to check out the news about the price of the crop.

The PDA contains the information about the amount of crop that will be brought out to sell to the public. The statistic of each crop is also available. The PDA is sending the marketing situation signals to the farmers helping them to plan and pass the information through the member in their cluster. Of course, PDA is expensive for the farmers in Bangladesh. Farmers are often rented them for a price of around US $2 per day. The use of PDA can create value for farmers allowing them to generate more revenues or harvesting at the right time.

The Cluster Modeling

The big questions facing the agricultural sectors in the Greater Mekong Subregion (GMS) are that which model we should use to develop a cluster in this region. While synergy, the intervention of the external agents, and the information technology play the important role in the success of developing the cluster, the human factor is also as important as well. The development of cluster of agricultural sectors in the Greater Mekong Subregion (GMS) requires strong motivation from all stakeholders that are farmers, middlemen, distributors, and big buyers such as restaurant and supermarket.

Good communication and management are essential because participants may come from different countries and background. The bargaining power of members in the cluster will rise if the member of the cluster can create an export consortium that will act as a middleman for the GMS. The role of this consortium is to provide the market information, understand the need of the members. They need to map the requirement of supply and demand side in order to find the gap. If the gap does exist, the consortium needs to find the way to reduce this gap. In the end, relationship building is substantial for the success of cluster development. The consortium needs to have the strategy that can help this member to work together as a team.

AEC Trends and Experience with Cluster Modeling for Agriculture

The concept of clustering in developing countries has been widely researched. At present, agricultural industry clusters grow promptly and play a vital part in some regions. ASEAN Economic Community (AEC) strategic thrusts; Enhancement of International Competitiveness of ASEAN Food and Agricultural Products Commodities. To achieve this action plan it is an important choice to promote agricultural development by using agricultural clusters. Agricultural cluster modeling has evidence in some ASEAN Economic Community (AEC).

Abecia (2003) reported the concept of clustering in agriculture

works, that the creditable performance of the Bukidnon Lettuce Cluster has been achieved with farming technologies, shared experience and market access to their institutional markets in Metro Manila, Philippines. Shepherd (2005) reported based on the work of Flordeliza Lantican in the case study of "The Bukidnon Lettuce Cluster, Mindanao" that cluster provides a model of an integrated approach that involves close liaison with input suppliers, transporter and buyers. The coordinating role of leading farmer appears to be the essential components of the cluster's success.

Summary

Lastly, the agricultural sector cluster plays a helpful part in certain phases such as stimulating the growth of regional economics, cultivating the whole agricultural productivity and enhancing the competitive advantage of agricultural products in Asian Economic Community (AEC). To be specific, the Cluster Modeling for Agricultural Sectors in the Greater Mekong Subregion (GMS) should develop, and it requires strong motivation from all stakeholders and is guided by the government and its relevant department.

The coordinating role of leading farmer appears to be the essential components of the cluster's success in the case of Bukidnon Lettuce Cluster, Mindanao in the Philippines, a cluster provides a model of an integrated approach that involves close liaison with input suppliers, transporter and buyers.

Chapter Three

Electronic Commerce Strategy and Business Model for Agriculture

Introduction

A range of issues is crafting force for augmented use of information technologies and e-Business theories in the agricultural sectors. Accepting where information technology and e-Business concepts will enhance value to the distribution channels for agricultural involvements involves an understanding of the needs of the two main agents in the network that is agricultural producers and manufacturers.

The burst usage of electronic commerce (e-Commerce) by the business sector has been incredible since its origin only a few years ago. From governments to multinational companies, to individual startups, e-Commerce is progressively observed as a key business modality of the imminent. Affluence of operation, spreading markets, and reduced expenditures are factors that make e-Commerce solutions more and smarter, as apparent with the advance of online sales.

E-commerce has occurred as a customary of new machineries and trade practices with the prospective to intensely affect various fragments of the agricultural sectors particularly in the ASEAN Economic Community (AEC).

What is Electronic Commerce (e-Commerce)?

An e-Commerce is defined and designated in numerous categories. Definitions differ as do the labeled aspects of business models thus, crafting difficulties for researchers and professionals relying on the literature for assistance in understanding business models. Popularly, Zwass (1996) defines e-Commerce as the sharing of business

information maintaining business relationships and the conducting business transactions by means of telecommunications networks. He pointed out that e-commerce includes not only buying and selling goods over the internet but also various business processes within individual organizations that support the goal.

As explained by Yu, His and Hou (2002) that there is no accurate definition of e-Commerce by now; the popular idea of e-Commerce is that the every business party complements the business activities in the network. The every business bargain will be carried out through the internal network, external network and Internet. From 1970s on, farmers began to use the electric market, which is called the rudiment of e-Commerce. The remarkable character on the stage was that the both bargaining parties and the products offered were contacted by long-distance call and data processing system. The telephone was the main communication means and the computer was only used to store data. National information network infrastructure has been reinforced recently by many countries which make the Internet fee low, make the network information resource abundant. As the result, more people surfed on the Internet, which provided the possibility of the profit space for the enterprise e-Commerce activities.

Offer (2001) concluded that e-Commerce is thought to offer substantial benefits to agriculture, principally by reducing supply chain costs and thereby offering reduced input prices and better marketing opportunities for farm products. Campbell and Goold (1995) concludes that reductions in transaction cost are motivating businesses to incorporate e-commerce into their business strategy.

E-Business Model and the Development of Strategy

An electronic business model is a vital standard for the advancement of e-Commerce. Essentially, it provides the design rationale for e-Commerce systems from the business point of view. However, how an e-business model must be defined and specified is a largely open issue. Hooker, Heilig & Ernst (2001) defined e-Business as a business that uses computer media and involves a minimum of two players. E-Business focuses on management and

strategy. E-Marketing, e-Commerce, and e-Agribusiness are subsets of e-Business.

There are many business models that related to electronic commerce. Joo (2002) presents two classifications of electronic markets specifically intended for the tourism industry. These classifications are an integration of process or functions and cooperation among players. Nakayama (2002) argues that while electronic commerce greatly benefits consumers it may damages business and the economy because electronic commerce does not increase market demand, and no price and product differentiation prevail. Li (2002) investigates the evolution of Internet banking in the United Kingdom and concludes that Internet can be one of many channels through which customers can conduct their banking. The deployment of Internet as a more efficient distribution channel cannot bring sustainable strategic advantages to the organization. To be more effective, an organization needs to have more integration among trading partners.

Consider many cases of e-Business model that recently appeared. It shows that the success of e-business depends on how organizations can link customers, stakeholders, information, resources, and supporting functions well together. Therefore, in order to become successful, an organization has to form a strategy and develop an integrated management among all participants in the network.

The e-Commerce Scenario of Greater Mekong Subregion (GMS)

The agriculture sector, like many other sectors, encounters the challenge of renovating its business models and practices to embrace and account for the speedy growth of e-Commerce. The Greater Mekong Subregion (GMS) agricultural sector is not exempted on these challenges.

There is about sixty percent of the population in the Greater Mekong Subregion (GMS) who has been involved in the agricultural sector. The agricultural products account for more than ten percent of Gross Domestic Product (GDP) in every country within the GMS. GMS is the world leading exporters and producers in

many products such as rice, canned pineapple, shrimp, tuna, and frozen chicken.

GMS is now facing the challenge in term of working together and competing with each other in order to export their products to the world market. Many exporters of GMS agriculture products have started to add more value by selling more processed products. While raw agriculture products start to decrease the share of export of processed food and related products has risen more than twenty percent's at the same time.

Approach for Developing an e-Business Model

There are many ways to derive an e-business model. Some uses focus group discussion. Others construct a model base on their experiences within the industry. Many models just come up from nowhere. Do asking people who have experience in the agricultural field to come up with such an e-Model can be accurate for the GMS agriculture business? Achieving an e-Business model for GMS agriculture is not an easy task. Most of GMS farmers never lay their hands on the computer.

To come up with the e-Business model that would benefit the GMS agriculture business, this study puts up the discussion groups and structured interviews among people who involved in the entire supply chain of agricultural business and set up small group discussion in Nong Khai province—located in the northeast Thailand along the Mekong river. The participants are farmers, middlemen, government officers, NGO, merchants, distributors of supplies—chemical and fertilizer, We also interviewed executives and procurement agents of major supermarkets in Bangkok that distributed agricultural products such as Tops supermarket, The Mall, Tesco Lotus, Big C, 7-Eleven, Makro, and Golden Place.

People who do not have any experience about e-Business were educated and explained about the pro and con of electronic commerce. The producers of agricultural products, government officers, merchants, and distributor of suppliers were asked about how e-business would enable them. The middlemen were asked about how e-business can help them with the procurement processes of getting
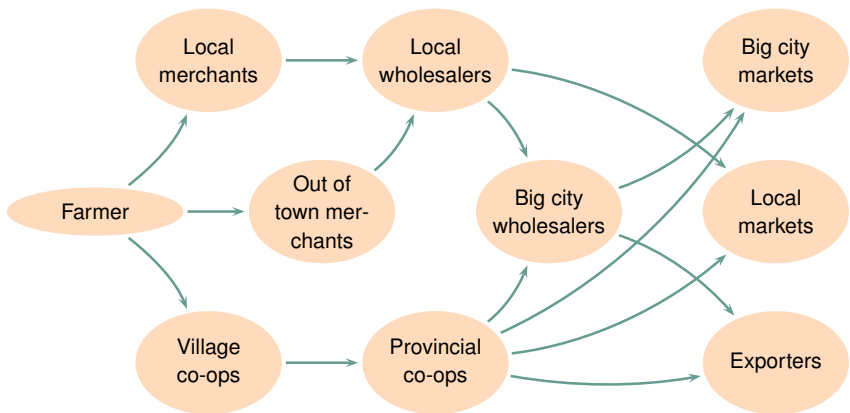
Figure 3.1   Supply Chain of GMS Agriculture Business

the products into their supply chain systems and how the information will help them distribute the products to the market or to the end consumers faster, fresher, safer and more reliable. The major supermarkets were inquiring information about how they are using information technology in their procurement process, the logistics, and the internal and external systems in which can guarantee that each supermarket has enough quality of fruits and vegetables to supply to their customers.

Agriculture Business Model in the Greater Subregion Mekong (GMS)

Our view is that developing an e-Model for GMS agriculture should be understood in term of how e-business can increase the relationships among stakeholders in the agriculture supply chain—supporting function, producers, middlemen, distributors, and retailers—to impel the generation of value by new combinations of participants. Figure 3.1 indicates that there are more than four steps before agricultural produces can get to the consumer's hand.

There are three major methods for Greater Subregion Mekong (GMS) farmers to sell their products. The farmers can sell their products to local merchants who live in the area. Most of them are the local shop owners who may lend money or give credit to the

farmers for their purchase of seeds, chemical and fertilizer before growing fruits and vegetables in each season. The out of town merchants usually come in the area during the harvest season of each crop. They may also set up contract farming and guaranty to buy the crop during the harvest time at the agreed price. Village co-ops (co-operative) are a group of farmer that cooperate on join production, selling at the same price, in order to overcome common problems, achieve the higher output volume of crop in a single sell. Co-op helps farmer to be able to demand higher prices and conquer bigger order beyond their individual reach when there is a demand for big lot order.

Local wholesalers are major buyers in the area who are well connected with Bangkok wholesalers and exporter. The local wholesalers usually act as the collector of agricultural produces for bigger buyer. Provincial co-ops are bigger than village co-ops and usually taking care of the marketing function for village co-ops when there is an excess of supply in some products. Most of the farmers join the co-ops not only for marketing reason but also for lending money. Today, lending money seems to be the number one reason why farmers join co-ops.

Before the agricultural produces get on to the hands of the consumers, the local markets, big city markets, and the exporters play an important role. The high volume in their hands giving them the advantages to negotiate better prices for the supply of agricultural produces in the supply chain. Overall, there are more than four steps before the goods can get to the consumers. Each step requires a sufficient margin. This is one of the reasons why farmers in Laos Cambodia China Myanmar Thailand and Vietnam never make money at all.

E-Commerce Strategy for Agriculture Sectors in the Greater Subregion Mekong (GMS)

Budzynski (2001) suggests that the first step in moving toward e-commerce is recognizing what components are needed for an effective strategy. The five key elements of effective e-commerce business strategy are customer focus, value focus, profit model, branding, and channel conflict management. The planning process for e-

commerce is also involving strategy, structure, and supporting systems.

For years, agriculture sectors in the Greater Subregion Mekong (GMS) have tried to use Information Technology (IT) as a tool to support the agriculture business. However, most of them cannot make a sufficient return on their investment. Getting people to pay for using the e-Commerce services are very difficult. Many businesses are skeptics when it comes to how electronic commerce driven growth, reduce cost of doing business, and increase the revenue. Such is the draw of the three e-commerce strategies here, dealing first with the local level, second with the national level, and certainly the regional level.

How do we construct electronic commerce strategies for the Greater Subregion Mekong (GMS)? First, make sure all of our stakeholders understand the importance of integration in all the level. Second, the success of integration depending on the collaboration in order to achieve the same objective. Third, the government in each country must provide the mutual rules, regulations, and policies for GMS in order to promote the use of electronic commerce in the area. And fourth, establish the electronic commerce special team—a team that consists of members from each Greater Subregion Mekong (GMS) countries working together to create an electronic commerce framework for the region without thinking about their countries' agenda. This group will only work on the establishment of the GMS electronic commerce road map of the region. The findings will then be used to plan the electronic commerce strategies at the national and local level.

The e-commerce strategies at national level should include the policy to help both private and public sectors to increase the Internet subscribers by increase the opportunity for people to buy more personal computers. The basic infrastructure such as telephone line and electricity must also be in place. Indeed, the basic infrastructure will improve the communication among people throughout the area allowing the use of information technology to establish fast communication between consumers, retailers, businesses, and government.

A good example of the e-commerce strategy at the national and

regional levels is the Information Communication Technology Corridor project that has been initiated by the Ministry of Information Communication Technology (MICT) in Thailand. The project aims to reduce the digital divide by way of building up the basic information technology infrastructure for grass-root people, link member countries with high speed connectivity, develop common skill standards to promote the flow of talents among member countries of this project that are Laos, Vietnam, and Thailand.

The electronic commerce strategies at local level should focus on human resource activities. The more people understand the value of information and what electronic commerce can do with their lives, the more people will participate in the electronic commerce. The local strategy has better pay attention on creates more workforce with certain skills and expectations that can be used to tackle the changing world in the information age. The training program for people at all levels of computer literacy must be prepared.

A good example of the electronic commerce strategy at the local level is the development of the information community (i-Community) and the community chief information officer (Community CIO) project in Nampong town Khonken Thailand. This project intends to set up the community networks through the use of information technology. The concept of this project is to take all the information available in the community and turn them into useful ideas allowing the community to make smart decisions. Nampong i-Community has the lowest priced access to the high-bandwidth communication supporting the new learning environment. People in Nampong town, Khonken province, can also find community information at any instant.

The project community chief information officer (community CIO) is responsible for gathering and managing a wide array of information within the community in order to organize the information into simple format that are usable by citizens with electronic access to the community server system. There is a steering committee consisted of key members in the community that participates and engages in every activity of setting the i-Community. The i-Community project truly allows policy maker to see how informa-

tion technology can affect the community, creates social economic value, generate learning environment, and achieving the better living standard for the community.

AEC Trends and Experience with Electronic Commerce Strategy and Business Model for Agriculture Sectors

The prompt progress of e-commerce offerings defies to several organizations particularly in the ASEAN Economic Community (AEC), The e-ASEAN framework agreement states that members shall "adopt electronic commerce regulatory and legislative frameworks that create trust and confidence for consumers and facilitate the transformation of businesses towards the development of e-ASEAN."

Recently, Modesto Ibarra (2012) reported from the South Cotabato that Philippines adopts e-commerce to promote agribiz sector. He pointed out that e-Commerce, which is considered the sales aspect of the expanding online or electronic business, refers to the buying and selling of products or services over electronic systems such as the Internet and other computer networks.

Singapore as a small country with limited natural resources realized the importance of the new economy and the need to position itself as an information and knowledge hub in Asia. The government has taken an active role in the establishment of an e-Commerce infrastructure. The government's vision is to build a premier service hub in the region with global orientation, and focusing on new high growth hub services (Chan & Al-Hawamdeh, 2002)

Summary

In conclusion, the electronic commerce strategy for agriculture sectors in the Great Mekong Subregion (GMS) is very dynamic. The strategy can change all the time because farmers usually consider time spend in the fields is more important than participating in the information technology. They often feel that computer literacy is beyond their requirement. For those already familiar with the electronic commerce, the high information exchange must be encouraged. Therefore, the success of

developing electronic commerce strategy for agriculture business depending on the interaction among stakeholders with the idea of switching the traditional model of conducting business with the information technology. The more people are involved in sending and receiving the information both online and offline, the more people in the agricultural sectors will strengthen the sense of participating in the information technology community.

Chapter Four

Building an i-Community: The New Asia Imperative for Social Development

Introduction

In today's environment, information is the key to everything. This chapter presents the process of how to build an Information community (i-Community) in Thailand. The objective of i-Community is to take all the information available in the community and turn them into useful ideas allowing the community to make smart decisions. The success of i-Community depends on how people work together, create a learning environment that have an impact on the community and how they live their life. The topics such as how to choose a location, how to get community involve, and the concepts of community chief information officer (Community CIO) and community reporter are also introduced.

What is Information Community (i-Community)?

In Kuppam, more than several hundred kilometers from Bangalore, India, one of the first information community (i-Communities) initiatives is created. The i-Community in Kuppam creates public-private partnerships to accelerate economic development through the application of technology while simultaneously opening new markets and developing new products and services. Dunn (2003) suggested that an i-Community is a thriving, self-sustaining economy where greater access to technology permanently improves literacy, creates income, and provides access to new markets, government services, education, and health care. World Business Council for Sustainable Development (2005) concluded that the i-Community initiative starts with understanding the community's needs and works to create a holistic impact on all the domains that matter to the community. It also embraces a systems thinking

approach and integrates the various initiatives into a composite program.

The concept of Information Community (i-Community) is also similar to Community Informatics (CI) also known as community networking, electronic community networking, community-based technologies or community technology refers to an emerging field of investigation and practice concerned with the principles and norms related to information and communication technology (ICT) with a focus on the personal, social, cultural or economic development of, within and by communities. Gurstein (2004) explained that Community Informatics (CI) were concerned with these processes of communities adapting and transforming, networking and binding, responding to and becoming the authors in the unending and increasingly rapid flow of information within and among communities and between communities and the larger society. Community Informatics (CI) addresses this process of adaptation and transformation through a systematic concern with the "how"—the infrastructure, the devices, the connectivity of enabling and empowering; the "how to"—the training, the community and organizational development; the "necessary conditions"—the funding, regulatory objectives of enabling and empowering communities.

The Emerging of Telecentres

The introduction of a telecentre into a typical rural community in a developing country represents a substantial innovation for that community (Harris, 2001). There is evidence that telecentres have played a major role in mobilizing communities to address their development problems. Telecentres can be used as information hubs that capture, repackage and disseminate information to rural communities (FAO 1998). A community telecentre will be the rural population's first encounter with Information Communication Technology (ICT). Moreover, telecentres that seek to bridge the digital divide in rural areas in developing countries are mostly experimental. Telecentres strive to deliver the simple interface between ICTs and the Internet, and offer basic communication services including telephone, fax, typing, photocopying, printing, and training in the use of various ICTs, emails, and electronic networking

(Whyte, 2000; Russell, 2000; Graham, 2002). It is an accessible facility that provides computer access for people who are unable to meet the expense of a computer, in addition to technical instruction (Beamish, 1999). Telecentres become centers for the delivery of rural development support services for their community catchment areas (Gurstein, 2000).

The Multipurpose Telecentre (MCT) is a shared information and communications facility for people in the rural, isolated and underserved areas that provides facilities and support for a wide range of services and applications in response to the needs of the community (Ernberg, 1998). By sharing the cost of the telecommunication infrastructure, IT facilities and support, the MCTs are expected to provide both public and private ICT-based services at a more affordable cost and still be commercially viable (Ernberg, 1998) mentions that MCT provides public services (i.e. telecommunication, distance learning, telemedicine etc.), and private services (i.e. postal and banking services, and functions as an outlet for other communal services such as water and electricity). The offer of private information and communication services will improve the sustainability and increase the effectiveness of the MCT. User support and training given to users are features that distinguish MCTs from other typical telecentres. The main aim of the MCT is to develop the rural community's capacity, provide a means for them to participate in democratic processes, and to produce information and knowledge, which is relevant to their needs.

AEC Trends and Experience with i-Community

Saga (2007) reported the roles of stakeholders of Telecentres at Post Offices Malaysia are; (1) Government—provides policy and strategy to steer the program, (2) Post Office—provides key infrastructure and (3) Community—Program driver and to ensure the sustainability (volunteers from the local community) by; (1) Establishment of steering committee, (2) Development of local content and portal site and (3) Implementation of IT training course (e-Learning). Ibrahim and Ainin (2007) concluded in the research "The Influence of Malaysian Telecenters on Community Building" that the positive and effective KedaiKom usage is significantly influencing

the community building of the underserved community. The implementation of KedaiKom in an underserved community generally builds community. KedaiKom brought a positive change in people's everyday lives by creating a combination of a new form of online communication, enhancing the existing offline relationships, and creating a new medium of acquiring information among local community members Saga (2007)

In addition, Community e-Center (CeCs) from the Philippines first Community e-Center (CeCs) has established on 20 October, 2004. An outlet for providing the general public with affordable access to a variety of services using information and communication technologies (ICT), such as telephone, Internet access, e-mail, fax, telex/telegram, computer training, distance learning, online services and other kinds of services/information relevant to the community. The outlets will be in strategic areas accessible to the common "tao," such as the municipio, the post office, the barangay hall, or any similar area where most of the local folks congregate almost daily. NCC (National Computer Center) aims to establish 100 CeCs all over the country. The role of CeCs is to become a center of information for agriculture, education, health and livelihood.

Information Community (i-Community) in Thailand

The i-Community in Thailand intends to set up the community networks through the use of information technology. The concept of i-Community is to take all the information available in the community and turn them into useful ideas that allow the community to make smart decisions. It has low priced access to the high-bandwidth communication supporting the new learning environment. People in i-Community can also find community information at any instant. The National Research Council of Thailand (NRCT) initially funded this project for a year. Today, the i-Community is managed and given financial support from the community.

Choosing Location

Meanwhile, more than seventy percent's of the Information Technology (IT) projects approved by the Thai government in 2003 are

related to the electronic government (e-government). Only a small number of IT projects are focusing on the grass-root people. An interesting project among those is One Village One Internet Connection which the government intends to hook up more than seven thousand villages with at least one internet connection.

Similarly, IT project from Malaysia, the e-Bario is a development project that utilizes computers, telephones, and VSATs to connect villagers in the remote village of Bario to the Internet. Sanctioned by the Government and administered by a combination of public and private domestic and international players, e-Bario demonstrates the many ways in which ICTs can be used to help marginalized communities in Malaysia develop socially, culturally and economically. Conceptualized and inspired by a group of researchers seeking to identify methods of connecting rural and isolated communities to the Internet (ITU, 2006).

Surely, people in the up country has heard about the internet but not many of them have had a chance to get their hands on it. The technological gap between parents and children also comes into existence because the children tend to have an opportunity to experience technology from school while the parents are lack of proper training and equipment. What should be done now?

In 2004, the first i-Community in Thailand was developed in Namphong district, selecting from other ten locations, a Khonken province in the northeastern part of Thailand, about four hundred kilometers from Bangkok. Namphong was chosen because after reviewing all the ten locations it became clear that Namphong met all the basic requirements of becoming an i-Community which is adequate telecommunication infrastructure, good size of the community, close distance to major highway, active school, containing industrial sites, having tourist attractions, and strong leadership at all levels.

Getting Community Involved

How did we get the community involved? For starters, we notified the Khonken governor's office and explained them the objectives of i-Community initiative. Luckily, this was an easy part because

Khonken is one of the provinces besides ChaingMai and Phuket that the Thailand government tried to promote and establish to become the first group of Information Communication and Technology cities (ICT cities). The government's goal for these ICT cities was to keep the local economy booming, increase the level of IT industrial investment, and improve better living of the people by developing the readiness of IT infrastructure, more trade, exhibition, conference, and tourist in the area.

The first group of target audience in diffusing the i-Community concept in Namphong was sheriff, School principals, business leaders, and monks. How to get the community involved was a challenge. We worked closely in setting up the i-Community with the local people. Thus, i-Community project could be viewed as an IT project for social development rather than a technology project itself. It took several months to explain and inform the local people about the notion of i-Community. The true measure of success in this project was how people working together, creating learning environment, and making better decisions that would have the impact on the community and their lives.

Moreover, there was a steering committee consisted of key members in the community who participated and engaged in every activity of setting up the i-Community. The i-Community project truly allowed policy makers to see how information technology could have an impact on the community, create social economic value, generate learning environment, and improve the living standard of the community.

The Equipment

Information Technology infrastructure was certainly one of the most important factors in setting up the i-Community. In Numphong district, limited numbers of people in the community had access to basic infrastructure such as telephone lines. Some had been requesting a telephone line for more than five years. Clearly in the case of broadband service, no telecom company would want to invest their resources in the areas where the number of users was still small. In order to get the broadband service from the telecom

company, we had to promote the interest of the local community in using the broadband services and initially we could come up with almost thirty households; allowing us to successfully getting attention from the telecom company.

Even though there was a small number of users and little money to be made by offering basic broadband service in Namphong, the telecom company was willing to provide the services to the i-Community as the good will for their businesses. The telecom company shifted its focus from making money out of the users in the community to join hands with the i-Community project. We tried to increase the IT literacy in the area and hope to see that the community had better access to information allowing people in the community to open up to more channels of communication and improve their decision making.

The i-Community server was located in the Namphong school—the biggest K12 school in Namphong consisting of over two thousand students. We chose this school because, first, it was equipped with those who are competent enough to maintain the system. Second, students could help promoting i-Community concept to their parents. Next, the principal had strong leadership and well connected with other leaders in the community. Forth, this school already offered many IT training courses to the community. Figure 4.1 displays the i-Community network.

The Community Chief Information Office (Community CIO)

The Community Chief Information Officer (CIO) was responsible for gathering and managing a wide array of information from the community. Then, organize the information into a simple format that could be easily used by the citizens with electronic access to the community server system. College students in the area were responsible for training the community members and those who already had some basic knowledge of computer to become the community CIO.

We currently have almost twenty communities CIOs in the Namphong area. The community CIOs takes the human-centered approach, meaning that they have to help the people in the area
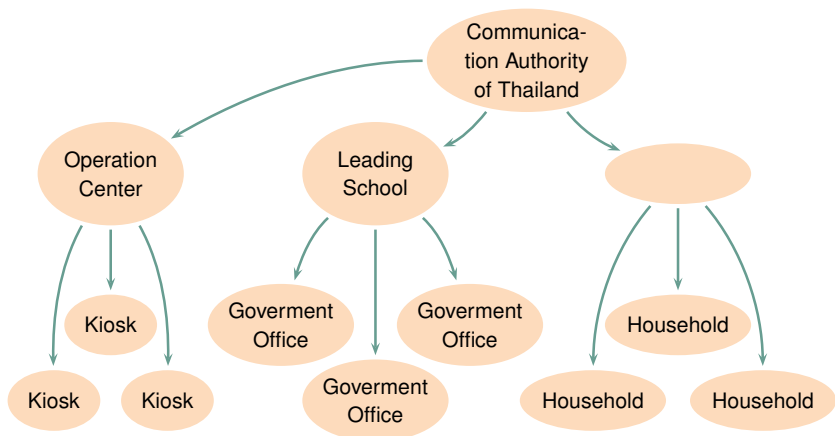
Figure 4.1 The i-Community Network

to increase their information technology literacy. The community CIOs is also now attempting to promote the use of equipment such as computer kiosks, which are in place throughout the community. Figure 4.2 shows how people are using the i-Community kiosks to connect to the Internet in various locations.

The Community Reporter

Information is the key to drive the i-Community value. Davenport (1994) suggests that the human-centered approaches should focus on how people use information rather than machines. The information should be broad types and more emphasize on sharing. We selected several groups of students from Namphong school and trained them to become community reporters. These community reporters worked under the supervision of the teachers in the school. Without them, there would be very little information to put into the i-Community database.

The Information

There are three types of information that were put into the i-Community database—information for people outside of Namphong, information needed from outside for people in the Namphong community, and information just for people in the com-

Figure 4.2   How People Are Using the i-Community Kiosks to Connect to the Internet

munity. Information is fundamental to decision making. People in Namphong widely use the Internet for news, searching for information, and showing their local products on the web. Martin and Cohill (1999) suggest that information generated by local people is worth more than its face value because it is backed by the integrity of fellow local citizens. A good example is the Namphong lottery database, which shows statistical records of how many people in the community spend on purchasing lottery. We are not trying to encourage people to buy lottery but using lottery information as a gimmick to hook people up online. The statistical data, such as

how many times certain number has won, is in the i-Community database.

Before people can look at the lottery statistics, they must answer two questions. First, how much money did they spend on the lottery last time? Second, how much did they win or lose. Assume six months have past, with only one keystroke; we can have information on how much money the community spends, win, and lose in the lottery. We do not need to persuade the community not to buy lottery, but the amount of the money they lose can help them make better decision—to reduce the amount of money spend on lottery or put it in a better use. Surprisingly, it helps teaching the community to think as a whole.

Other information in the database, for example, is how many acres in the community are growing cabbage, cutting date for each plantation, waiting time to deliver sugar cane at the sugar mill. Flexibility and better responsiveness due to information sharing help people in Namphong plan their harvest time well and make better decision. They know exactly the price and how much cabbage will be in the local market today. The farmer can make decisions when to cut the cabbage and bring them to the market. Of course, the information may not help them much in term of making money, but it is better for them to make decisions based on information.

Community Commitment

The i-Community initiative only got funding in the first year from the government. It may be too soon to say how successful the i-Community will be after the equipment throughout the community become out of date and need new replacement. When this happens, the more money and community commitment is essential. Today, at the beginning of second year, there are many problems such as operation costs, the lack of monitoring people, and high costs of broadband network which account for more than sixty percent. To tackle such problems and to raise funds, a number of people in the i-Community are setting up the budget that will be used for maintaining the i-Community network.

The Future of i-Community

Unfortunately, the future of i-Community depends heavily on the collaboration among stakeholders. As we have discovered, such collaboration leads to expansion of participation. For example, we can see the increase of IT and social development projects from government and private sectors not only in Namphong but also in Namphong proximity.

Today, i-Community operation center, which consists of about twenty personal computers, has become one of the popular social spots for the community. It provides access to information for everyone in the community. The primary interest of people in Namphong is to learn how to use computer, Internet, and simple software to solve practical problems of everyday life. The number of Internet users, amount of time spends, type of use, and information exchange also increases in the area. For those who do not come to the operation center, they can use the high speed Internet Kiosks that are located throughout the community.

The Thai government is also investing more money to reduce the digital divide not only for Thailand but also in collaboration with Laos and Vietnam. For instance, the Information Communication Technology Corridor project aims to reduce the digital divide by way of building up the basic information technology infrastructure for grass-root people, linking member countries with high speed connectivity, and developing common skill standards to promote the flow of talents among member countries.

Summary

With much currently change is linked to the growing significance of information, the organization of change has been greatly aided by improvements in information communication technology (ICT) specifically in the arena of informatics. Building Information community (i-Community) play a vital role in many changes that individual in the community experience. Arising of telecentres, cybercafé and other access to information program established respond for the changes.

Namphong i-Community is the new Asia imperative for social

development. It is a two-way communication network, allowing people to get and give information. It draws the new concept of social development by educating, creating teamwork, and generating information for better decision making. The more contents there are the more information will be exchanged. Many people in the i-Community now has a wide range of computer skills. They also develop basic research fundamental and become community researchers in order to contribute information to the i-Community database.

Strong commitment from all levels is the key success factor for building i-Community. Now the involvement of the community goes to a whole new level. We are using technology to link people together and open up more opportunity. Certainly, the strategy is working. The digital divide may still exist in many areas, but surely the gap is decreasing in Namphong and in other four i-communities in Thailand that established after the success of Namphong.

Chapter Five

The Supply Chain Modeling of Pesticide Free Agricultural Products in the Thai Multinational Supermarket

Introduction

The demand for global pesticide free agricultural products is growing rapidly. For instance, the organic farming industry is growing as much as 20 percent per year, according to the International Trade Center, a monitoring group linked to the United Nations. Health is becoming one of the most interesting topics discussed among the Thai community today. We have seen many finesses and spas being built around the country.

   This suggests that Thai people are becoming more health conscious than ever before. The tendency of Thai people to consume more pesticide free agricultural products, also means the farmers, middlemen, traditional Thai markets, groceries, and supermarkets could have decades of potentially important work of getting these products to the market ahead of them. Therefore, the cooperation among these groups is very important in order to create more supply for the increasing demand and also a due support to this industry in terms of improved supply chain management system it can positively provide Thai's in that manner any agricultural centered economy a significant development.

What is Supply chain?

Supply chain are composite bodies that assist numerous roles. They are institutional arrangements that link producers, processors, marketers and distributors. Supply chains are forms of industrial organization which allow buyers and sellers who are separated by time and space to progressively add and accumulate value as products

pass form one member of the chain to the next (Hughes, 1994; Fearne, 1996; Handfield & Nichols, 1999) Applying the concept of supply chain in agricultural produces provides a lot of benefits among stakeholders. Iyer and Bergen (1997) mentioned that agricultural supply chains are also economic systems which distribute benefits and which apportion risks among participants. Thus, supply chains enforce internal mechanisms and develop chain wide incentives for assuring the timely performance of production and delivery commitments.

"Supply chain thinking encourages a system-wide view of the chain—focusing as much on the linkages between technologically separable segments as on the management of processes within those segments" (King and Venturini, 2005). Thus, an agricultural supply chain encompasses all the input supply, production, post-harvest, storage, processing, marketing and distribution, food service and consumption functions along the "farm-to-fork" continuum for a given product (be it consumed fresh, processed and/or from a food service provider), including the external enabling environment (Jaffee, Siegel, & Andrews 2008). The supply chain modeling depends on the current needs of the agricultural sectors. Like for instance, the supply chain modeling of pesticide free agricultural products in the Thai multinational supermarket, applied the bidding model, selected suppliers model and contact farmers model.

Production of Pesticide Free Products

One of the biggest problems with pesticide free products is that not many people understand the definition of pesticide free products. As a result, most consumers and even the producer themselves are sometimes confused about the product classification. To consider a product to be pesticide free, the residues found in the product must not exceed Maximum Residue Level (MRL) limits in accordance with CODEX standards (A joint FAO/WHO food standard program) and Thai National Standard that is set by the Ministry of Agriculture.

The pesticide free products can be classified into two groups that are organic and hygienic products. These two categories are differ-

ent in term of the pesticide usage level. The organic product has no pesticide residues because the growing process does not involve the use of pesticide at all. Thus, it considers being the safest products between the two. The hygienic product uses some pesticide but limited the level of possible contamination. The safety level is also relatively high.

The size of the pesticide safe fruits and vegetable markets in Thailand is very difficult to determine and estimate. Nevertheless, most of pesticide safe products are sold in almost every market segments such as the local traditional morning market, supermarkets such as TOPS, The Mall, Lotus, Big C, Lemon Farm, Golden Place, and Green Net. The developing of direct marketing for the pesticide safe products is also interesting because it has been expanding rapidly. There are several groups of organizations that start selling pesticide safe products directly to consumers, for instance, Veggies Basket and Green Net.

The challenges facing the farmers who produce the pesticide free fruits and vegetables are the market demand and the knowledge about the production processes. The key issues that drive the farmers to produce the pesticide safe products (i.e., fruits and vegetables) are their price which is usually higher than the general products. Hence, the more market demanded pesticide safe products, the more farmers will participate in growing them.

Many of the current problems and challenges regarding to the penetration rate of the pesticide free fruits and vegetables in Thailand are related to the amount of supply and the variety of pesticide free fruits and vegetables that the farmers can harvest. Out-of-stock items and missing some seasonal items are problems faced by many stores and supermarkets to varying degree.

Many supermarkets in Thailand are finding the way to eliminate the out of stock problem, therefore, tie up with suppliers and farmers of pesticide free products. The supermarkets prearrange the order through a bidding process, selected number of suppliers who would fill up the orders for the supermarkets, and use contract farming to guarantee the output of the pesticide free products that will feed into their procurement system.

Approach in Understanding the Supply Chain Modeling

To understand the supply chain modeling of pesticide free agricultural products in the Thai multinational supermarket, this study interview the producers of the pesticide free agricultural products in several locations. The interviews of the producers included vegetable plantations in Samudsakorn and Chiang Mai provinces. There are eight middlemen that were interviewed for this study namely the Thai market in Northern Bangkok, Four-cornered Market in Bangkok, and six major markets in Chiang Mai province. We also interviewed executives of three major supermarkets in Bangkok that distributed pesticide free agricultural products.

The producers of the pesticide safe products were asked about the production problems, the knowledge of how to grow the pesticide safe products and why quantity and quality of the production are not stable. The middlemen were asked about the procurement processes of getting the pesticide safe products into their supply chain systems and how to distribute them to the market or the end consumers. The major supermarkets were inquiring information about the procurement process, the logistics, and the internal and external systems in which can guarantee that each supermarket has enough pesticide free fruits and vegetables to supply to their customers.

Bidding Model

The supermarkets are taking a concept of bidding that has been practicing in multi industries. The supermarkets select several groups of farmers who grow pesticide free fruits and vegetables then listed them in the bidding group. These farmers must adapt the hygienic requirements that set by the supermarkets. The asking price of the crop is submitted to the supermarket.

If the bid is accepted, the price is locked in. The bidding process usually is not interactive for the fruits but more interactive for the vegetables. The suppliers usually submit the bidding before the harvest time. The participating farmers that accept this price will deliver the products to the supermarket distribution centers at the
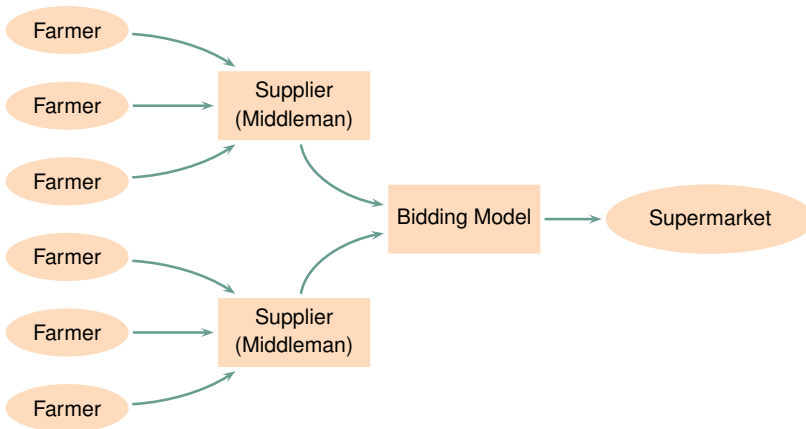
Figure 5.1   The Bidding Model

requested time or let the transportation companies picked the products up on their plantations. Figure 5.1 shows the Bidding Model.

Selected Suppliers Model

A growing number of supermarkets are trying to reduce the searching costs of pesticide free fruits and vegetables by dealing with pre-approved suppliers. The supermarkets select suppliers who can supply the pesticide free fruits and vegetables to them all the time. These selected suppliers, who also acted as the middlemen, are important for distribution from farms to supermarket because most pesticide free plantations are often small in size and production.

The selected suppliers have a responsibility to gather the products from various locations and guarantee the quality and the growing process of the fruits and vegetables that are delivered to the supermarket. This approach is expected to substantially reduce the procurement cost, control the quality of pesticide free products, and improve the efficiency of the supply chain by consolidating their purchasing power with selected suppliers that usually offer lower prices for higher volumes.

The supermarkets are usually only order a single product from each supplier in order to spread the orders and create networks of suppliers in their procurement system. These suppliers must be able
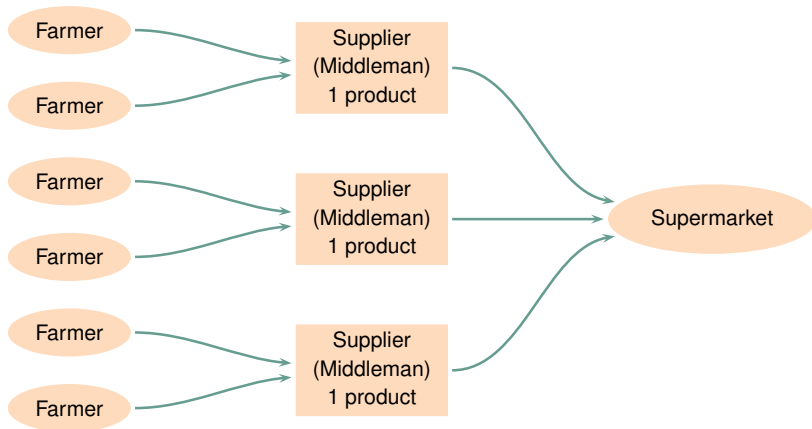
Figure 5.2   The Selected Suppliers' Model

to supply the products to the supermarkets for the entire year. Note that this is also about minimizing the uncertainty in the supply side. This way, the supermarkets only have to deal with a small number of suppliers instead of having to deal with many farmers and small middlemen, resulting in lowering the searching costs. The selected suppliers' model can ensure the quality and the consistent price of fruits and vegetables being delivered to the end consumers. Figure 5.2 shows the Selected Suppliers' Model.

Contract Farming Model

Contract farming is nothing new for the agricultural industry. However, the contract farming model is usually a common practice in the food processing companies such as Frito-Lays that give the potato to farmers in the Northern part of Thailand and guaranty to buy back at the agreed price.

The contract farming model of the supermarkets is similar to the contract farming in the agricultural industry. It also promised to take care of the farmers who produce the pesticide free agricultural products to the supermarkets and promised to take care of the output from the farm. However, it is more difficult to find the farmers who would be on the contract farming with the supermarkets because growing the pesticide safe products requires more work and
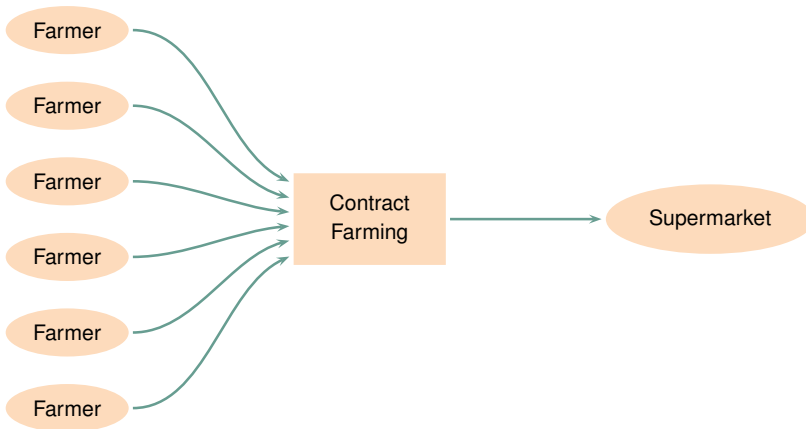
Figure 5.3   The Contract Farming Model

attention than ordinary production. The problems that these farm-
ers who grow pesticide safe fruits and vegetables are facing include
low outputs, unstable in the quality and quantity of productions,
high production cost, and the price of the pesticide free that is as
low as same as the general products being sold in the market. Fig-
ure 5.3 shows the Contract Farming Model.

The Potential of Information Technologies to Improve the Existing Supply Chain

Buhr (2000) suggests that there are at least three key issues that
will drive the development, implementation and improvement of
the information technology in the economics of agriculture. These
three key issues are the development of new information technol-
ogy themselves, the potential to trace previously no identifiable
food attributes from conception to consumer and the changes to
the market structure and firm organization of participants in the
supply chain.

Banks and Bristow (1999) argue that the information technology
alone may not help sustain the future success of agro-food supply
chain. The challenge facing the agro-food sector today is that the
food quality and the complexity array of supply chains make pro-
ducers to put more emphasis on quality.

Boston (2002) indicates that the organic farming industry that used to be small is now expanding. It is not easy to control processes at the farms and the quality of the products. As the industry grows, the suppliers of pesticide safe products are finding it harder to ensure the quality of their products and must create quality control and the information system that can link suppliers with the main customers such as the supermarkets.

It is true that information technology plays an important part in order to improve the existing supply chain of pesticide safe products. Information technology will allow the information about the availability of pesticide safe fruits and vegetables that are available at the given time to flow to the supermarkets computer database. This information will help the supermarkets to be able to have an opportunity to set up a promotion or selling strategy. For example, the supermarkets can pack pesticide safe vegetables that were available at that time together along with tofu, ground pork, and glass noodle as a prepackaged and sell them as a tofu soup prepackaged.

The information technology will allow the Thai supermarkets to do many interesting things, like finding out which pesticide free agricultural products are the most sought after, and which fruits or vegetables customers are buying. Leveraging information regarding on the consumer buying pattern can enable the supermarkets to close the loop with their stores in different locations, customers, suppliers, and the farmers.

Summary

In conclusion, three models of the linking processes from the producers of pesticide free agricultural products to the major supermarkets in Thailand have been discussed. These models are bidding, selected suppliers, and contract farming. The three models would be more functional if there is the involvement of information technology to link the information from farmers, middlemen, and the supermarkets.

It is clear that Information technology will help the supermarkets to be able to control inventory and just-in-time delivery better. Automatic reordering can be established to maintain

pesticide free fruits and vegetables on hand. The suppliers will be able to get information regarding the increases or decreases in demand due to seasonal or market changes. This will make it possible for farmers to plan ahead and the supermarkets to be able to fill in the right products with the right amount at the right supermarket locations due to the minimum supply of the pesticide safe products. Finally, the management approaches still needed to engage the farmers, suppliers, and the supermarkets in the effective implementation process to achieve the world-class supply chain position.

Chapter Six

New Spark in Collaboration through e-Agriculture

Introduction

Since the commencement of the information uprising numerous applications of the internet and associated machineries have been required and installed in virtually all fields of human exertion Currently we dialogue about e-commerce, e-banking, e-governance even e-voting. These are well recognized applications that have greatly altered the way we do things.

The agriculture sector is not immune to the new wave widespread across the world. One can easily portrait e-commerce as doing business online, e-banking as making financial transactions using the world wide web but when you talk of e-agriculture could it be growing plants and animals online or what?

Several years ago, Information Community (i-Community) has been introduced in five provinces (i.e., Khon Kaen, Chaiyaphum, Maha Sarakham, Udon Thani, and Nong Khai) in the North East and one in the central (Ratchaburi) of Thailand. The i-Community intends to set up the community networks through the use of information technology by taking all the information available in the community and turns it into useful ideas that allow the community to make smart decisions. These i-Communities have low priced access to the high-bandwidth communication supporting the new learning environment. People in i-Community can also find community information at any instant. The National Research Council of Thailand initially funded this project for couple years. Then, the Ministry of Information Communication Technology supported the project by expanding the concept into five more provinces. Today, every i-Community is managed and received financial support from the community.

Today, i-Community has transformed people's lives. People start

using computers and having access to all kinds of information. About 5,000 people are members of i-Community. Some have developed social relations among members in different sites. This is progress, still modest. Many people, especially farmers in the rural areas, do not yet get enough information on livestock, equipment, seed, fertilizer, and market that fit their needs.

Electronic Agriculture (e-Agriculture) is the project trying to build a database that collect enormous amounts of data from stakeholders such as various government agencies, local wisdom, marketplace, farmer's fields, and others. The project is using i-Community as the implementation sites. E-Agriculture's database contains necessary information that caters to all segments of the agro industry. The challenge is how to collaborate among organizations that have this valuable information and how to link farmers, harvesting collectors, middlemen, exporters, and government officials together in order to use the necessary information to arrange better supply chain, create a social network that improve relationships and keep stakeholders in constant streaming contact with one another. This project is supported by the Ministry of Information and Communication Technology and Ministry of Foreign Affair.

What is e-Agriculture?

The Food and Agriculture Organization of the United Nations (FAO) proposes the following definition: "e-Agriculture" is an emerging field in the intersection of agricultural informatics, agricultural development and entrepreneurship, referring to agricultural services, technology dissemination and information delivered or enhanced through the Internet and related technologies. More specifically, it involves the conceptualization, design, development, evaluation and application of new (innovative) ways to use existing or emerging Information and Communication Technologies (ICTs). "e-Agriculture" is an emerging field for enhancing sustainable agriculture and food security through improved processes for knowledge access and exchange using information and communication technologies (ICT).

A variety of innovative Information and Communication Tech-

nology (ICT) occur that are dominant gears for providing farmers with the awareness they need to put agricultural modernizations prospects to be greatest usage. Sharma (2007) emphasized that ICT Diffusion and Infusion have many potential applications spanning the breadth of the agricultural industry; at all scales of organization from the farmer; to cooperative and professional bodies; from farm machinery vendors; fertilizer and chemical companies; insurance; regulators; and commodities; to agronomists; consultants; and farm advisors.

The use of Farmnet is one of the innovations in e-agriculture. World Agricultural Information Centre (n. d.) defined the FarmNet as a network of rural people and supporting intermediary organizations, such as extension services, using ICT and conventional communication media to facilitate the generating, gathering and exchanging of knowledge and information. Operated by farmers and their organizations, a FarmNetlinks farmers to each other and to the resources and services that they need to improve their livelihoods through agricultural productivity, profitability and food security.

The e-Agriculture Community

World Summit on the Information Society (WSIS) (2005) defined the e-Agriculture community as a global Community of Practice, made of people from all over the world who exchange information, ideas and resources about the use of information and communication technologies (ICT) for sustainable agriculture and rural development with a mission to serve as a catalyst for institutions and individuals in agriculture, forestry, fisheries, natural resource management and rural development to share knowledge, learn from others, and improve decision making about the vital role of ICT to empower rural communities, improve rural livelihoods, and build sustainable agriculture and food security.

With over 8,000 individual members from more than 160 countries and territories, the e-Agriculture Community includes information and communication specialists, researchers, people in rural institutions, farmers, policy makers, business people, students, development practitioners, staff at NGOs/CSOs and in international

institutions and governments. All these people benefit from the experiences and good practices shared within the Community.

AEC Trends and Experience of e-Agriculture

Aquino (2008) reported the launching of e-K Agrikultura in the Philippines that DA's strategy in developing agricultural sectors The e-K Agrikultura is a unified program aimed to enhance the delivery of accurate agriculture and fisheries information to users' for appropriate decision making and business development. It is a dynamic, interactive, and responsive modality using information communication and technology to improve, enhance, coordinate and manage the e-learning of all agriculture stakeholders.

Also, it is used as a development strategy to make agriculture a business activity through the utilization and application of information and knowledge for enterprise and agribusiness development. ICT initiatives and programs for people, communities and industries, incorporate the value of responsibility and accountability.

In Malaysia, Samah et al., (2009) concluded that Malaysians in the agriculture sector perceive ICT as having a positive impact on their productivity.

Farmers Online

Henderson, Dooley, and Akridge (2004) suggested that 43 percent of farmers in the United States were having Internet access in 2001 compared with only 13 percent in 1997. Today, the number of farmers with Internet access should be around 85 percent in the United States. US Department of Commerce reports that there are less than 5 percent of the sales of wholesale grocers and farm product raw materials and less than 20 percent engage in typical electronic commerce activities. The numbers mentions here may be too high for Thailand.

National Electronics and Computer Technology Center (NECTEC) in Thailand conducted a survey in 2007 and points out that people in Thailand go online in order to search for information (23 percent), send electronic mail (21 percent), and play game (10 percent). While most people use Internet in Thailand, only a few en-

gages in electronic commerce activities—the goods and services sold online. The increasing number of Internet accessibility not only in the city but also in the rural area and the ability to adequately use the computer will help boost up electronic commerce transactions. Electronic Agriculture (e-Agriculture) is likely a project to reduce a barrier of information technology adoption and engage more in electronic commerce activities.

Much Collaboration, Many Challenges

For farmers, information needed is usually under the Ministry of Interior (e.g., Community Development Department, Department of Lands, and Department of Local Administration) and Ministry of Agriculture and Cooperatives (e.g., Department of Livestock, Department of Fisheries, Department of Agriculture Extension, Land Development Department, Office of Agriculture Economics, and National Bureau of Agricultural Commodity and Food Standard). How can farmers in rural areas of Thailand with limited skill in computer literacy capable of searching for information that may scatter around? The answer is they cannot, at least for now. One solution to this problem is to build them up and give them a simple tool that farmers can use to find information conveniently.

Over the past several years, there have been initiatives in the focus of rural informatics strategy. If the project such as i-Community is about vertically aligning information with people in the community, the e-Agriculture has been about horizontally aligning information across many groups of people. Though everyone realizes the importance of information, key questions remain open about how to transform them into knowledge and wisdom that allow each one to share their expertise consistently and effectively.

In every i-Community, there is a small group of people who know about how things go, how to live, how to solve problems, how to get things done, how to find markets, and has invaluable expertise in many areas including various agricultural processes that lead to high output and produce that tastes great, cultural identity, and sustainable models of producing agricultural products. These values have never been documented in the digital format and rarely

share with other people outside their community. By participating with e-Agriculture, not only the farmers buy anyone can find and share information and ideas that they might be able to apply in their lives, and so ensure better living and economic conditions.

Ensuring Good Information

Information's needs assessment is used to observe the behavior of four group's namely raw agricultural products (e.g., fresh fruit, vegetable), livestock, fisheries, and processed agricultural products. A survey is used to gather data from stakeholders in these agriculture groups, and those who have data that is valuable for farmers in the areas. Then, focused group is conducted to make sure data collected covers every topic of interest and how the community will use the information. The information is not hard to find, but selecting the right information and transform them to a symmetric format that can give users' ideas, knowledge, and wisdom is not an easy task.

To facilitate not only information but also knowledge exchange, an e-Agriculture web portal is established. The information situated in the website is nothing more than a collection of data unless people can use them to share ideas and technical skills that solve problems, formulate marketing and negotiating objectives, and set strategies that help maximize opportunities. Martin & Cohill (1999) suggest that information generated by local people is worth more than its face value because it is backed by the integrity of fellow local citizens.

There is various type of information in the database of e-Agriculture web portal that tailor made to fit the interest of people in the community, for example, how many acres in the community is growing cabbage, cutting date for each plantation, waiting time to deliver sugar cane at the sugar mill. Flexibility and better responsiveness due to information sharing help people in the areas plan their harvest time well and make better decision. They know exactly the price and how much cabbage will be in the local market today. The farmer can make decisions when to cut the cabbage and bring them to the market. Of course, the information may not help

them much in terms of making money, but it is better for them to make decisions based on information.

Information is the key to drive the e-Agriculture value. Community reporters are responsible for collecting data and keeping the database alive. Community reporters are people in the community who have been through extensive training in the process of collecting data, how to use multimedia tools and customize software that design for simple data entry. Without them, there would be very little information to put into the community database. Davenport (1994) supports that the human-centered approaches should focus on how people use information rather than machines. The information should be broad types and more emphasize on sharing.

Community Integrated Web Resources

Today, the modern distribution outlet like supermarkets, hypermarkets, and department stores are account for more than 50 percent of food sales (Australia's department of foreign affairs and trade). The rise of supermarkets and modern distribution business in the food sector in Thailand still continues. The purpose of e-Agriculture is to engage very seriously about how small-scale farmers can enhance their competitiveness through the use of information technology that can increase agribusiness supply chain effectiveness, better rural livelihoods, and participate in the changing market condition.

For years, the Thai government has been building up a database and websites in order to push constructive information to the public. However, information alone cannot create interest for Thai farmers. Even though, there are many types of data available online, but the data are located in multiple locations. In many respects, ministry of information communication and Technology and ministry of foreign affair realizes that a single agriculture window of information for farmers is important and needed. E-Agriculture web portal is created in order to provide farmers with easy access to search for a wide range of information as well as integration paths amongst the various data types.

Farmers can share ideas, knowledge and information across boundaries not only through the website but also by verbal commu-

nication. This website uses magnet topics that are selected during the information's need assessment process to draw participants. For example, one of the magnet topics for commercial beekeepers in the area is where to find pollen for their bees. Beekeepers usually drive around for a hundred kilometers in their ten wheeler with wooden bee boxes trying to find flowers. In the past, most of them communicate only via the cellular phone. That is changing now as more beekeepers start to input flower blooming time and its location into the system resulting in lower transportation cost and searching time.

E-Agriculture provides better opportunity and convenience for people to gain knowledge in virtuous fields that lead to higher quality crops and constant gratification that is, for instance, information about market, price, seed research, branding, storage, packing technology, product choices, product comparisons, transportation cost, credit, and customer directory for local crops. Information gets updated every day and store in several formats such as video clip, sound, and text to illustrate the contents that matter to the people in the agricultural sector. Henderson et al. (2004) also points out that a key to expanding farmers' electronic commerce activity is the ability to build personal relationships over the Internet that satisfy farmers' service needs.

The success of e-agriculture adoption depends on the degree of integration among the data available from multiple locations that assist farmers to make decisions using a wider variety of data. Future growth in activity is more likely depend on personal and business relationships that are going to be form not only via the Internet but also through the traditional face-to-face communication.

Summary

In rural areas where access to symmetric information is limited, e-Agriculture becomes one of the essential tools for identifying useful data, sharing knowledge, wisdom, and leveraging individual expertise. The support from local community such as leadership, financial, sponsors, and technology is very essential for maximizing a community information network value.

From building a community information network to develop its contents, the success of social development through the use of information technology depends on the involvement of people not only in the community but also from other stakeholder in the area that is local government, school, extended education, and the farmers themselves. When entering data, sharing information and knowledge via e-Agriculture web portal becomes more and more social process embedded in the larger network of participants, a social network that keeps people in the community in constant streaming contact with one another will happen.

Chapter Seven

A Competitive Strategy for Traceability Implementation in the Supply Chain through Mobile Phone

Introduction

Over the past decade, food supply chains have become much longer and more intricate as food is gradually traced from farmers and exporters across the globe. Foodstuff can be made offered from plantation to supermarket within 24 hours. But, degraded by main food security alarms in importing countries (particularly amid EU member states and USA), increasing anxieties over food security and authenticity of food, supply chain actors have come under increasing inspection, and are today mandatory to record, validate, and document all produce transient through their hands.

Farmers, harvesting collectors, middlemen, and exporters in Thailand have taken heat lately for a slew of requirements from overseas buyers. From United States to Europe, buyers have asked suppliers in Thailand for the ability to track their orders from harvest through storage, processing, packing, transport, distribution, shipping, and sales. So far that is what National Bureau of Agricultural Commodity and Food Standards (ACFS) under the ministry of agriculture also wants to do.

With the aid of technology, the concept of food traceability has come of age. Today, it is technologically feasible and cost-effective to track batches of produce from individual farmers across the world, all along the supply chain, right through to the retailer's shelf.

But with the proliferation of software-based traceability solutions, one of the major practical challenges lies in ensuring technological compatibility among competing systems, both among individual ac-

tors within a specific supply chain, and more broadly, among countries.

The quality management and quality assurance standard from the International Standards Organization (ISO) characterizes traceability as the ability to trace the history, application or location of an entity, by means of recorded identifications that can be used in four distinct contexts namely product (i.e., relate materials, origin, processing history, distribution, and location after delivery), data (i.e., data generated throughout the quality loop), calibration (i.e., measuring equipment to national or international standards), information technology (i.e., design and implementation of a system).

Traceability systems can work properly based on the collaboration among stakeholders that are farmers, harvesting collectors, middlemen, and exporters. National Bureau of Agricultural Commodity and Food Standards (ACFS) in collaboration with Kasetsart University, Info mining and FoodReg seek sustainable competitive advantage for agribusiness by offering a traceability system that is user friendly and convenience for everyone in the fruit chain.

Future traceability systems can only really be effective in mitigating risks if common requirements—both technological and regulatory—are met by all Member States. Hence the need for harmonization of food safety standards, along with rapid alert mechanisms and information-sharing through traceability systems, that is accepted and inter operable across countries. Recognizing this, ASEAN has established the ASEAN Food Safety Network (AFSN) to provide a cohesive approach to regional and national-level bodies to help harmonize food safety regulations among member countries and ensure transparency in sharing food safety information between exporting and importing countries, both within ASEAN and other trading blocs such as the EU, Japan and USA (Udomwongsa & Ellis, 2009).

What is Traceability?

The idea of tracing products from their source to the purchaser is not a modern knowledge. Numerous businesses have integrated product tracing into their core setups for years. Noticeably, most of
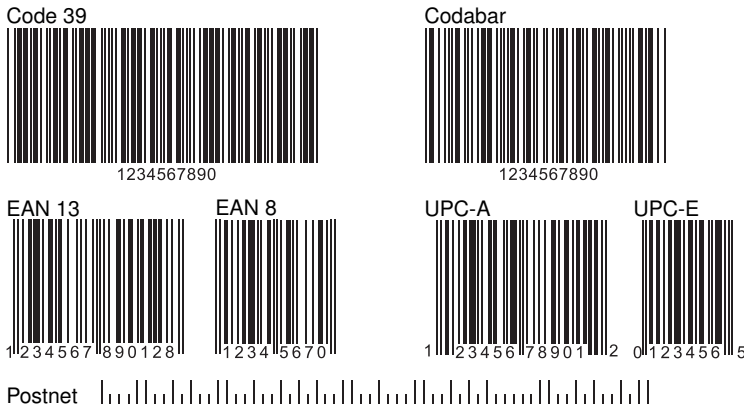
Code 39

Codabar

1234567890

1234567890

EAN 13   EAN 8

UPC-A   UPC-E

1 234567 890128   1 234 5670

1 23456 78901 2   0 123456 5

Postnet

Figure 7.1   Some Types of Barcodes

us have bought stuff, from shopping malls and grocery stores that are labeled with distinctive serial numbers or GS1 barcode identification system (Figure 7.1) permitting companies and government establishments to recognize and detect distinct goods. However, the overview of traceability into the fruits supply segment is a somewhat new notion that endures to improvement force, particularly in the ASEAN Economic Community (AEC).

Moe (1998) defines traceability as the ability to track a product batch and its history through the whole, or part, of a production process. As suggested by Kim, Fox, and Gruninger (1995) the traceability is the ability to track back a product and its history through the whole, or part, of a production chain from harvest through transport, storage, processing, distribution and sales or internally throughout the production stages.

As argued by Pinto, Castro and Vicente (2006), the requirement for traceability is limited to ensuring that stakeholders are able to spot the immediate suppliers of the product in question and the immediate subsequent recipient—one step back and one step forward. The traceability doesn't cover the step of retailers to final customers.

Today's e-traceability systems allow users to query the origin or details of recalled products in less than a minute. Consumers can now use their Smartphones to scan product barcodes and instantly obtain product information. Traceability brings added benefits for

producers and exporters in verifying the authenticity of high-value niche products such as organic or fair-trade produce—an increasingly important source of value-added in Asian agriculture (Udomwongsa & Ellis, 2009).

The Challenges of Supply Chain Traceability

To satisfy extensive traceability difficulties, stakeholders must arm themselves with the right resources, procedures, and understanding to locate and review every factor along the provide chain-from source, all the way to the display. And, the cost of all this understanding cannot be a hurdle to business economical achievements. To reach supply chain traceability, Viaene and Verbeke (1998) state that managing product and information flows effectively throughout the chain is a challenge.

Lo Bello, Mirabella, and Torrisi (2005) state that: "For complete product traceability it is necessary to record not only all incoming and outgoing movements of the production lots, but also all the procedures and processing operations applied to them." Companies need to exchange traceability data with other actors in the supply chain. They also state that integration of traceability systems with other enterprise systems is crucial in order to gain the most beneficial outputs from supply chain traceability and feel that security and authentication in the communication between the actors through the systems is a problem to be tackled. Kelepouris, Pramatari, and Doukidis (2007) agree that information on the total product's life cycle is needed in order to achieve supply chain traceability.

Wang and Li (2006) state that a properly designed traceability system is crucial to assure that data collection is managed effectively and that the right data are collected. They also state that integration of traceability systems with other enterprise systems is crucial in order to gain the most beneficial outputs from supply chain traceability. They also highlight the sharing of information along the supply chain and good communication between the different actors as important aspects for successfully achieving supply chain traceability. Moe (1998) points out that the limitations or

particular aims of one actor in the supply chain set the demands or limit the traceability for the entire supply chain.

AEC Trends and Experience of Traceability

Udomwongsa & Ellis (2009) reported that the march towards a "Virtual ASEAN" is inexorable. Across the region, governments and the private sector face growing pressures to leverage the latest technologies to improve food safety along cross-border food supply chains. Thailand is now implementing a traceability system as a strategy to add value to Thai rice and boost consumer confidence. The Philippines are investing in a US $5 million Traceability Center for Agro-Industrial Exports (P-TRACE), supported by the United Nations Industrial Development Organization (UNIDO). Malaysia has a well-established traceability system for palm oil, driven by the Roundtable on Sustainable Palm Oil (RSPO), and aimed at sustainable production and protection of tropical rain forests and wildlife. And last year, Vietnam, fronted by the Vietnam Association of Seafood Exporters and Producers (VASEP) and the Vietnamese State Agency for Technological Innovation (SATI) introduced a food traceability system for aquaculture based on RFID technology, in collaboration with IBM. Recently, Al-Haadi & Begawan (2012) reported that Brunei ICENTRE incubatee John Harith Technology is looking at global deployment of its RFID (Radio Frequency Identification) Halal Traceability System—RFID is the use of an object (typically referred to as an RFID tag) applied to or incorporated into a product, animal, or person for the purpose of identification and tracking through radio waves.

Traceability for Thai Fruit Supply Chain

Does Thai fruit industry need the traceability system to seek sustainable competitive advantage by offering products that can track their history through the entire chain? Fisk and Chandran (1975) point out the importance of traceability to improve competitiveness of the firms. Florence and Queree (1993) underline that traceability open up opportunities to improve quality of the firm. Alfaro and Rabade (2006) concluded that buyer and supplier relationships in
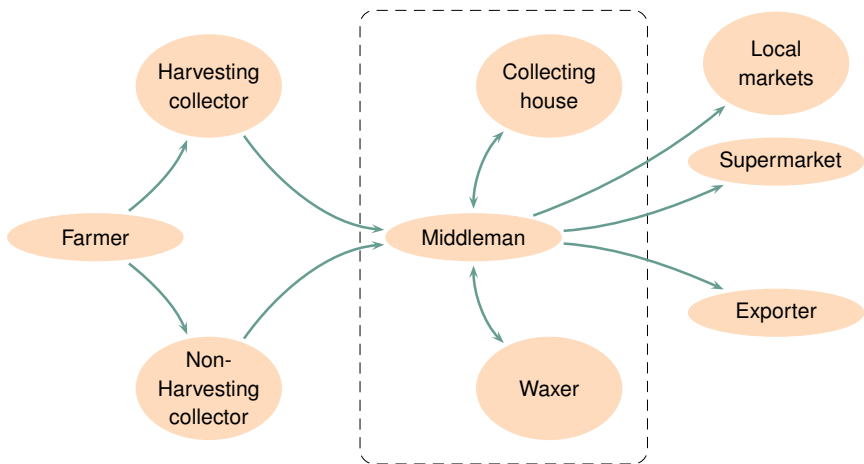
Figure 7.2   Pomelo Supply Chain

the vegetable industry are shaped by three factors, namely supplier factor, firm factor, and competitive environment factor. The traceability mechanisms and the buyer and supplier coordination are mutually reinforcing.

To come up with a traceability system for Thai fruit supply chain, a case study on pomelo (citrus fruit) is used to develop a competitive strategy on traceability. The pomelo is the largest citrus fruit normally weighed from one to ten kilograms and can be found in Southeast Asia. It is a cross between the grapefruit and the pomelo. The flavor can be either sweet or slightly tangy.

Farmers normally have two ways of selling their pomelo. The harvesting collector comes to pomelo plantation and does the reaping themselves. The non-harvesting collector lets farmers pick out the fruits for them. Then, both sell their products to a middleman who is also responsible for grading the products. The pomelo is usually graded in the cultivated area or at the middleman location. Now, middleman can sell this fruit to the local market, supermarket, or prepare them for export. For export, pomelo needs to be waxed−polish the outskirt. This process is done in the waxing house or at the collecting house. Then, pomelo gets put in the container for export. Figure 7.2 shows the pomelo supply chain.

Traceability System

The pomelo traceability strategy requires the collaboration among farmer, collector, middleman, and exporter. The system traces forward from a farm and a time window to a collection of export containers, trace backward from an export container of Pomelo to the farm where the fruit was harvested. In this case, everyone gets assigned identification number. The process of inputting data begins when collector receives pomelo from the farmer. The harvesting collector enters his ID number and answers a question. Is stock empty? The concept of empty lot is used here.

For example, the collector C1 may collect 500 pomelos from farmer F1 and 300 pomelos from farmer F2 on day 1. The collector C1 enters farmer ID, quantity (pieces), and weight. The collector C1 then dispatches these items to the middleman. If collector C1 clears out all stock at this time, he answers YES to the question: Is stock empty? On the other hand, if collector C1 does not remit all harvested pomelos, he enters NO in to the system and will enter YES in to the system once all pomelos on hand get shipped to a middleman. This is a one lot size. The process continues for all dispatch events until the next stock empty.

Once pomelos are received, middleman starts loading the fruits that have been waxed to a container. For traceability to work, middleman must work in one container at the time. Clearly, middleman can get fruits from different collectors. The middleman also keys in harvesting collector ID, type, size, number of boxes, container ID, and exporter ID to the system. After the buyer receives the container full of pomelo, the buyer enters the container ID and client ID (i.e., the same number as exporters ID the middleman keys inside) into the system.

To trace backward, when there are problems with the fruits, buyer tracks back one step down and find out where the container came from. Exporter gets notified and track back to which middleman is responsible for packing pomelo into the container. Middleman then locates the harvesting collectors that shipped pomelo to him. Harvesting then look at all harvest events since the last stock empty before shipping to middleman during that time. Even with all these

steps, it may not allow us to trace back to the exact pomelo grower. We can only narrow down to the last group of growers that the harvesting collector brings together in one lot size.

The above process may not seem a big deal, but to get the collaboration among the stakeholders is a difficult task. Everyone who participates in the traceability pilot project likes the idea of traceability, but without the requirement from exporters or the government enforcement, the traceability may not work. Most of harvesting collectors do not want to reveal where they get their products from. Lack of trusting other partner is also the issue here. Longer term, it would require lots of effort from government, exporters, middlemen, collectors in order to make the traceability system work well. Figure 7.3 demonstrates how the traceability works.

The Use of Mobile Phone for Traceability

Choosing the right equipment for traceability is a personal choice. Problem is, convincing farmers, collectors, middlemen and exporters to buy other equipment's such as personal computer or notebook and carry them around for input data may be difficult. Today, mobile phone in Thailand is reasonably priced allowing anyone to have access to it.

The study of Abraham (2007) showed the role of mobile phones in improving the efficiency of agricultural markets in India, more specifically on the fish market, where mobile phones enable fishermen to land their fish where the market price is higher. The impact of mobile phones is also confirmed by the study by Aker (2008), the study demonstrates that the use of the mobile phone enables cereal growers to increase their trading area and hence their reserve price. By reducing monopsonies improved dissemination of information in Niger has triggered a movement that is smoothing prices over extensive geographical areas.

The General Packet Radio Service (GPRS), a mobile data service available to users of GSM mobile phones, is required for downloads and install traceability program to the mobile phone. The mobile phone weakness is at the keyboard. Even though, it is difficult to type quickly or accurately on a keyboard that is very small. The
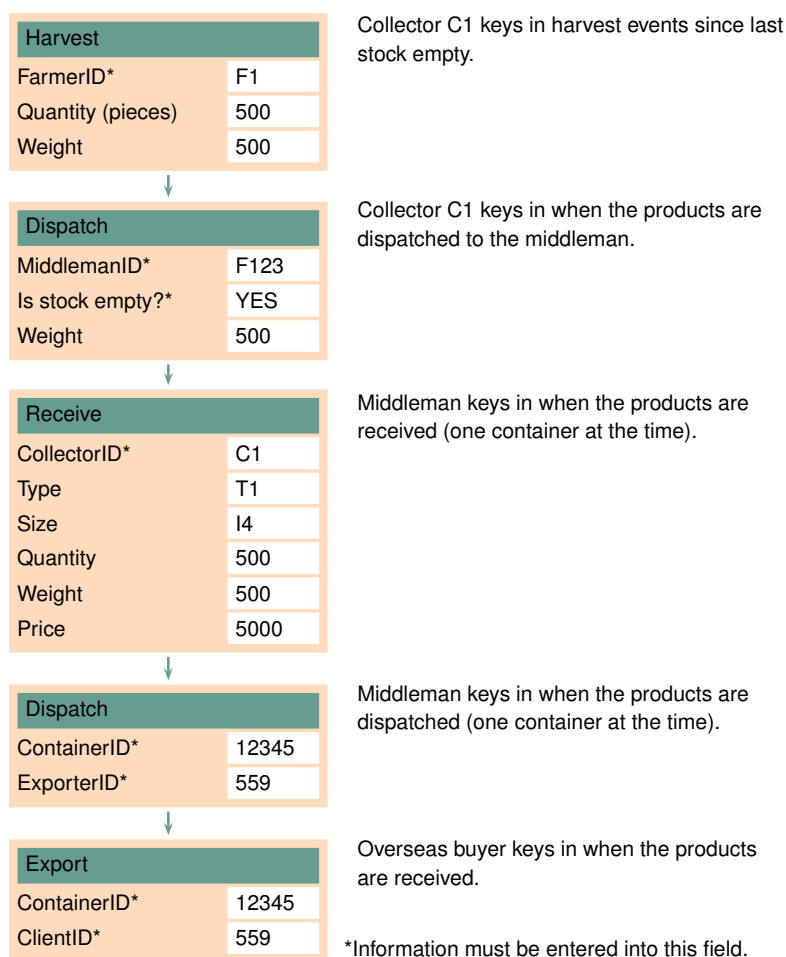
Harvest	
FarmerID*	F1
Quantity (pieces)	500
Weight	500

Collector C1 keys in harvest events since last stock empty.

Dispatch	
MiddlemanID*	F123
Is stock empty?*	YES
Weight	500

Collector C1 keys in when the products are dispatched to the middleman.

Receive	
CollectorID*	C1
Type	T1
Size	I4
Quantity	500
Weight	500
Price	5000

Middleman keys in when the products are received (one container at the time).

Dispatch	
ContainerID*	12345
ExporterID*	559

Middleman keys in when the products are dispatched (one container at the time).

Export	
ContainerID*	12345
ClientID*	559

Overseas buyer keys in when the products are received.

*Information must be entered into this field.

Figure 7.3 How Traceability Works

ease of carrying the input device for traceability that is small, inexpensive, and many already have them allow the traceability to be effectively managed.

Traceability as an Export Booster

It is not hard to see why running traceability on the mobile phone is clearly more attractive to the farmer, harvesting collector, middleman, and exporter than carrying around other equipment's. While traceability is important, not all data are essential to make the

Figure 7.4 Trace Form on Mobile Phone Screen

system work well. The required data are farmer ID, middleman ID, stock empty, collector ID, container ID, and client ID. Other data such as quantity, weight, type, size, and price are less crucial but also relevant. For successful traceability to occur it is also important that the data input is kept at a minimum level. Figure 7.4 depicts trace form on mobile phone screen.

Traceability can not only conform to the international requirements but also help to increase value in food safety and quality assurance, gain customer trust, and keep records to carry out the well-founded opportunity for the Thai farmers. Perhaps there are still some stakeholders who do not feel comfortable about traceability. The barrier to resistance is lack of understanding about traceability. One thing is certain, without government intervention, traceability may not work effectively.

The process of putting up the traceability is viewed as a series of stages that are visiting participants and explain the importance of traceability, fill in paper registration form to keep the record of participant, confirm the technical specification of the participant's mobile phone, send Short Message Service (SMS) with download instructions to participants, participant downloads and installs the traceability system into mobile phones, and finally participants starts using the system.

In boosting for more fruit export, traceability can help control quality and create the foundations for partnerships among farmers, harvesting collectors, middlemen, and exporters. Buyers develop more trust and confidence due to increase access to information. Traceability adds value to the products allowing exporters to use the information about products extend strategy and find more oversea companies to start doing business with them.

Summary

Our findings are also similar to what Pinto et al. (2006) has discussed. Traceability can work properly based on pen and paper versions but they are time when technology that is user friendly can help reduce paperwork, eliminate redundancies, and increase accuracy. Some might argue that there are several technologies such as computer, handheld device (i.e., Palm or pocket PC) that have bigger screen would be more suitable in term of data entry than the mobile phone. However, price and availability of the mobile phone make it easier for farmers, harvesting collectors, middlemen, and exporters to participate in the traceability system.

The success of traceability will take time. Everyone needs to work together for years and years before the traceability concept is well understood by all stakeholders. Getting people involved with the system is not an easy task. The success of traceability comes down to the people, the trust, the exchange of information, and what value stakeholders place on it.

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Rural Informatics for ASEAN Agribusiness Transformation is the collection of extensive research in the field of Technology Management. This book illustrates how technology strategies work in the agricultural sector.

Information Communication Technology (ICT) does not just provide information to people in agribusiness. ICT is a mechanism that creates impact on how stakeholders in agricultural supply chain are working together.

This book points out how technology should be used effectively. Multiple examples in ASEAN countries demonstrate how we can get the most from the technology and how technologies can help those in the agricultural supply chain maximize their ability to improve agricultural production process for getting the best results.