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THE ROLE OF GOVERNMENT TO BRIDGE DIGITAL GAP BETWEEN URBAN AND RURAL AREA IN KOREA

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Abstract

The Ministry of Food, Agriculture, Forestry and Fisheries (MIFAFF) in Korea has made an abundant effort to develop agricultural/rural informatization since the 1990's. Initially, it focused on the development of three different types of infrastructure to bridge the gap between rural and urban areas: household personal computer (PC) penetration, Internet use, and broadband Internet connection accessibility. The 81% of broadband accessibility in 2002 increased to 100% in rural areas in 2007. In addition, from 1998 to 2002, a total of 241,356 farmers took diverse education programs provided by MIFAFF. As a big effort from MIFAFF, Food and Agro-product e-commerce of Farmers has also increased continuously; as of 2009, its transaction is estimated as 1.89 billion USD. Many projects on u-Farm have been launched for future intelligent farming. However, MIFAFF are now facing new challenges.

Keywords: Digital Divide, Rural Informatization, Korean Government, agro-product e-Commerce

Short History of Agricultural/Rural Informatization in Korea

Control over the quality and quantity of products in the food and agriculture business is known to be very difficult. A predictable and manageable output is desirable for most businesses. That is, managers should be able to control the quality and quantity of their products. Predictable outputs help managers plan their marketing, sales, and inbound and outbound logistics, but these are not easy problems in the food and agriculture business. Various industries have adopted different levels of automation and utilization of information systems for quality/quantity control; informatization of the food and agriculture industry has been behind other industries.

In addition, South Korea is known as one of the leading countries for high-speed broadband access and for the high rate of Internet use in the world. However, there has been a significant digital divide between urban and rural areas in South

Korea. This digital divide issue is related to quality of life in rural areas, and is also known as an important factor of rural-urban migration.

In this regard, the Ministry of Food, Agriculture, Forestry and Fisheries (MIFAFF) in Korea has made an abundant effort to develop agricultural/rural informatization since the 1990's. The history of agricultural/rural informatization stems from the establishment of the Center for Agriculture Forestry Fisheries Information Service (AFFIS) in 1992. The vision of AFFIS is to develop rural/agriculture informatization for vital rural life and competitive agriculture industry. Since then, AFFIS, founded by MIFAFF, along with the Rural Development Administration (RDA), attempted to bridge the digital divide and develop informatization of the food and agriculture industries. About 70 staffs are working for rural/agriculture informatization in AFFIS.

Responding to the government efforts, Korean food and agriculture industries are now attempting to adopt ICT in order to satisfy diverse needs from consumers through quality/quantity control.

Infrastructure Development

The Ministry of Food, Agriculture, Forestry and Fisheries (MIFAFF) has focused on the development of three different types of infrastructure to bridge the gap between rural and urban areas: household personal computer (PC) penetration, Internet use, and broadband Internet connection accessibility.

In 1997, the rate of household PC penetration was just 18.7% in the rural areas of Korea. MIFAFF established several policies to supply PCs to rural areas at a low price or for free. For instance, MIFAFF, collaborating with other organizations in 2000, launched a campaign named "Sending PC to the Rural Area" to supply PCs to households in rural areas for free. Many companies, as well as individuals, responded to the MIFAFF campaign by donating new or used PCs. Due to their efforts, the rate of household PC penetration in rural areas sharply increased up to 50.2% in 2006. While it is still lower than that of urban areas, 79.6%, its gap has been diminished.

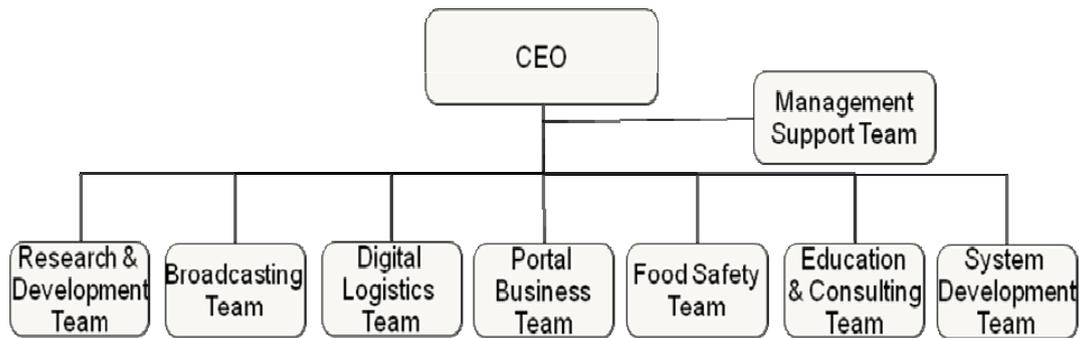


Figure 1. The Organization of AFFIS

The Internet use rate in rural areas has been continuously increasing since 1998. Only 0.6% of those who worked in the agriculture industry used the Internet. As of 2006, the rate reached 29.4% and is still increasing. It should be addressed that between 1998 and 2003, a swift increase, from 0.6 % to 16.2 %, was accomplished; this was not only due to the MIFAFF's campaign of "Sending PC to the Rural Area," but also to, for rural residents, a "Free Internet Connection Service," which was carried out by AFFIS. Farmers could receive a PC for free or at a very low price and could connect with the Internet without any charge. These notable policies were accompanied with free education programs on computer/Internet use for those who live in rural areas. These customized informatization education programs were mainly designed and provided by AFFIS and RDA.

Broadband Internet connection accessibility in rural areas was another big concern of the Korean government from the perspective of the digital divide. MIFAFF and MIC (Ministry of Information and Communication) requested that network operating companies, putting up with low profitability, extend network access to rural areas. Finally, the 81% of broadband accessibility in 2002 increased to 100% in rural areas in 2007. This number implies that anyone who lives anywhere in Korea can access high speed Internet anytime he wants.

Informatization Education

As discussed earlier, AFFIS and RDA have provided diverse customized education programs for informatization in rural areas since 1998. At the initial stage of this education policy, farmers were invited and assigned to a few education centers for lectures. However, in 2000, moving education centers using buses were invented to provide on-the-spot education for farmers; that is, farmers did not have to leave from their farms for a long time. This attempt made it possible to provide informatization education programs to 64 different sites throughout the Korean peninsula. In 2001,



Figure 2. Moving Informatization Education Center

more than 40 sites were added for informatization quick-response services towards local nearby farmers' requests related to IT use. education. Moreover, 22 universities participated in this education program; they provided

For computer novices, basic-level courses are presented; higher-level courses are offered to those who have already successfully completed basic and mid level courses. The contents of the high level course include web page publication, web site administration, bulletin board management, and so forth.

From 1998 to 2002, a total of 241,356 farmers took diverse courses on IT use for farm management. These information education programs made it possible for some farmers to

manage their own e-commerce sites. Now, many farmers in Korea are gaining high profit from their e-commerce sites. In 2008, MIFAFF announced that about 67,000 of farmers are likely to take those courses this year. Web-based e-learning systems have also been launched for farmers. Farmers can access all content for free. The contents of the e-learning systems are not just limited to informatization, but are extended to diverse production techniques and business management.

Information Services and Software Development

Relevant information is necessary for efficient decision making in business management. Farmers also need relevant information for their diverse decision-making in sowing, weeding, irrigating, use of fertilizer/pesticides, harvesting, and so forth. MIFAFF and its related organizations launched Internet-based information services to support farmers' decision-making in farming in 1993. The first information service through the Internet provided by MIFAFF was an "Agro-products Price Information System," which was operated by AFFIS in 1993. Price information of 20 different crops was presented day-by-day for farmers. Farmers could make a decision efficiently using this system when considering the point of harvesting in order to maximize their profits.

Information services for farmers have been extended to diverse areas, including crop insect pests, crop quality certificate guidelines, geographical information, precision agriculture, rural tourism, etc. As of 2001, the number of information services for farmers increased up to 124. Since then, more services for farmers have been provided by 40 different government organizations.

In 2006, responding to farmers' claims that too many information services made them confused, MIFAFF developed a new agriculture and food portal, "Green Net", which converges 150 different information services provided by 40 different organizations. This portal is not only for farmers, but also for consumers, so that these two different groups can communicate on the site. Moreover, currently, many mobile services are being launched for farmers who do not have enough time to sit in front of computers.

In addition to these information services, the Korean government developed and distributed diverse software programs to farmers. These information systems were designed to support farmers' decision making. In 2007, MIFAFF financially supported 33 ERP (Enterprise Resource Planning) system development projects initiated by agricultural corporate bodies and agricultural product processing centers. MIFAFF currently facilitates them to adopt RFID (Radio-Frequency

Identification) and sensor network technologies for their supply chain management based on a budget of 50 million USD.

Current Issues in Agriculture Informatization

During the last decade, consumers have shown concern regarding safety due to the breakout of mad cow disease, and the recent dioxin crisis. According to the UK Food Standard Agency, a survey found that 75% of consumers are concerned with food safety. Also, with the increase of wealth, Korean consumers pay more attention to the quality and freshness of food. In addition, though consumers in urban areas have to pay more and more for fresh food, monetary benefits to farmers have not increased satisfactorily in Korea.

The Korean government is considering how to overcome these challenges using ICT. What information and technologies are available (or can be developed) that can mitigate consumers' concerns on food safety? How do we provide consumers with fresh food at a lower price, while guaranteeing reasonable monetary benefits to farmers? Since the 2000's, the Korean government has newly focused on four areas to figure out these questions. In addition, inefficient logistics for agro-products has been pointed out as a chronic illness in Korea; middlemen have profited between farmers and consumers. MIFAFF has attempted to innovate the conventional manner of agro-product logistics.

Agro-product e-Commerce

In 1999, MIFAFF selected 106 farms that produce high-quality agro-products and supported their homepage constructions on the Internet. An additional 200 homepages were developed in 2000. These farms are facilitated to use their Internet homepages for their product marketing. AFFIS then developed an e-marketplace and hooked up farmers' homepages to the e-marketplace. Following MIFAFF and AFFIS's movement, RDA and the local government also developed farmers' homepages and associated e-marketplaces. Up to 2001, a total of 3,000 farmers' homepages were developed, and more than 1,500 homepages among them are hooked up to those e-marketplaces for online marketing.

The Korean government financially supported the costs of web hosting and mass-marketing for farmers. Farmers simply needed to focus on updates related to their products on their web site, and product shipping. Even though not all farmers could succeed, many farmers made considerable money in their e-businesses. Those who launched agro-product e-commerce formed a new community called the

“Cyber Farmers Union,” and their membership is now more than 3,000. They have regular meetings several times each year, and share their experiences and knowledge for successful e-business. Table 1

processing, transfer, and distribution, such as the birthplace of animals, feeding, medication, date of sale, slaughtering information, and other supply-chain-related information. In Korea, the Ministry of Food, Agriculture,

	2001	2002	2003	2004	2005	2006	2007	2008	2009
Total amount of e-commerce in Korea	3,347.1	6,029.9	7,054.8	7,768.1	10,675.6	13,459.6	15,765.0	18,145.5	19,529.1
(a) Fresh Agro-product & Fishery	101.4	307.5	294.5	280.3	284.7	312.4	393.1	493.4	547.6
	3.03%	5.10%	4.17%	3.61%	2.67%	2.32%	2.49%	2.72%	2.80%
(b) Beverage & Health Food	80.3	209.6	281.1	371.2	531.1	625.2	730.6	1,009.2	1,289.6
	2.40%	3.48%	3.98%	4.78%	4.97%	4.65%	4.63%	5.56%	6.60%
(c) Flower	21.9	32.6	36.3	37.4	40.7	42.4	51.5	50.5	57.7
	0.65%	0.54%	0.51%	0.48%	0.38%	0.32%	0.33%	0.28%	0.30%
(a) + (b) + (c)	203.6	549.7	611.9	688.9	856.5	980.0	1,175.2	1,553.1	1,894.9
	6.08%	9.12%	8.67%	8.87%	8.02%	7.28%	7.45%	8.56%	9.70%

Table 1. Food and Agro-product e-Commerce in Korea (unit: USD 1,000,000)

Note: Amount in 2009 is estimated based on the record of the first quarter of 2009. (Source: Korean National Statistical Office)

shows the increase in food and agro-products purchased through e-commerce in Korea.

As shown in Table 1, the total amount of e-commerce transactions in Korea has sharply increased since 2001. Food and Agro-product e-commerce has also increased continuously, but not as fast as the total amount of transactions. In 2001, the amount of transactions in food and agro-products was about 203.6 million USD, but in 2009 it is estimated as 1.89 billion USD, which is 9.3 times larger than that of 2001.

Food Safety & Traceability

As discussed earlier, the food and agricultural industries are presently facing several new challenges. Food safety, which has been at the forefront of the news recently, is regarded as one of the most important issues. For example, Korean consumers have the highest level of concern regarding the use of cloned animals, the use of antibiotics/hormones in meat, and food safety/hygiene.

The traceability of food is an emerging issue in many countries. Consumers would like to acquire sufficient information in order to make informed shopping decisions about food; however, they are unable to do so in most cases because information asymmetry exists between buyers and sellers. The Food Traceability System provides detailed information on food production,

Forestry and Fisheries (MIFAFF) has undertaken the traceability system on agro-products since 2004. Before the ministry began acting on traceability issues, RDA (Rural Development Administration) developed the first public Food Traceability System (www.atriace.net) in 2003. In September 2004, the ministry announced guidelines for traceability, and in October 2004, a beef traceability system (www.mtrace.net) was launched. In August 2005, it amended and promulgated ‘Agricultural products quality management law.’ Expectations toward the traceability systems are enhancing the international competitiveness of Korean agro-products by securing food safety and gaining credibility through organized management and a fast response to the food safety problem in the food supply chain by tracing backwards and forwards. It is also expected to fulfill consumers’ right to know by providing instant and accurate information on production, distribution, and merchandising of agro-products. Since January 2006, farms can voluntarily adopt a traceability system.

Information generated from traceability systems includes the name of the producing unit, field location, name of the product, amount of the product, fertilization and chemicals used, equipment used, transferring place, date of delivery,

name of seller, and so forth. Such information is identified using a label, barcode, or RFID tag. Consumers can easily access the information through a wireless mobile phone, computer via the Internet, or an on-site kiosk.

Currently, the Korean government focuses more on the beef cow traceability system because of Korean consumers' special concerns over the quality and the origin of beef due to mad cow disease. As of July 2009, all beef produced in Korea is forced to register to the traceability system by law. Consumers in Korea can inquiry all information about beef at www.mtrace.net.

In addition, advanced technologies, including RFID and USN (Ubiquitous Sensor Network) have been applied to new traceability systems in diverse areas in order to generate relevant and reliable information for food consumers in Korea.



Figure 3. Barcode Scanning and RFID Tag Reading for Traceability Systems

Ubiquitous Farming

Since 2004, the Korean government has enhanced all industries to adopt USN (Ubiquitous Sensor Network) and RFID (Radio Frequency Identification) technologies. The logistics industry was the first mover, rather than other areas, because RFID technology is known as a substitution for the use of bar codes. USN is known as an epochal technology for efficient object monitoring and controlling, including environment, production, etc.

In 2007, MIFAFF decided to adopt

USN/RFID technologies in the food and agriculture industry and launched six “U-Farm” projects that apply these technologies to traceability systems, barn and green monitoring, and so forth. A total of 6.4 million USD was invested to these U-Farm projects; the budget was developed and allocated by MIFAFF and MIC (Ministry of Information and Communications), and it also includes local governments' matching funds.

These U-Farm projects are outsourced to several consortia of SI (System Integration) companies, RFID companies, USN companies, middleware companies, and Food companies or Farmers' unions. Local government supervised each project and MIFAFF and MIC superintended all the projects. This year MIFAFF launched twelve U-Farm projects, as shown in Table 2. As of 2009, MIFAFF are initiating diverse plans to develop new technologies for intelligent green house and stall.

The Future of Agriculture Informatization in Korea

Roadmap of Agriculture Informatization

Today, the food and agriculture industries are more integrated than ever in an attempt to reduce risks and improve processing costs, from farm to table. Since its operations including production, processing, storage, distribution, and management are dispersed all over the world, the food and agricultural industries now depend more on ICT.

Responding to this trend, MIFAFF's policy is more focused on competitive food and agriculture industry development and welfare in rural areas, where it has focused on infrastructure construction and content development to bridge the digital divide. To achieve its future goals, MIFAFF developed a new policy, ‘2007-2011 Agriculture/Rural Informatization Basic Plan’ and set a new vision as ‘U-ACTIVE pursuing Global Top Food & Ago-products, and Rural Area.’ The plan proposes 34 new projects in 5 different areas to accomplish the U-ACTIVE vision. Figure 4 illustrates the U-ACTIVE vision prepared by MIFAFF. This vision will be the future for agricultural and rural areas of Korea.

New Challenges

MIFAFF currently considers establishing a TV channel for agriculture and rural communities based on IPTV and Digital cable technologies. This project stems from the world megatrend of “Convergence of telecommunication and Broadcasting.” But, who is the target of the TV channel? Rural residents? Urban consumers? Moreover, MIFAFF needs to develop feasible profit models to establish sustainable TV channel

business. Nobody wants another tax-wasting big giant.

Farmers who have taken big advantages from agro-product e-Commerce are pointing out the

TV channel. They expect more benefits from t-Commerce based on IPTV. However, t-Commerce requires each farmer to produce consistent quality-controlled products and the amount should

Title	Product
U-high-end brand "G-mark Mushhart" Traceability System	Mushroom
U-IT based "Red Dragonfly" Traceability System	Red pepper
U-IT based Korean Traditional Food Quality Control System	Red pepper paste
Flower Growth Environment Monitoring System	Flower
U-IT based u-Pork Quality Control System	Pork
U- rural Tourism Support System	Tourism
RFID Infrastructure for High Quality Rice	Rice
Jeju High Quality U-Fishery Support System	Fishery
RFID/USN based High Quality Fishery Production Support System	Fishery
RFID/USN based Jeju Pork FCG Monitoring System	Pork
U-IT based Fruit Insect Monitoring System	Fruit
U-IT based Fishery Logistics Information Portal System	Fishery

Table 2. U-Farm Projects launched in 2008

(Source: National Informatization White Paper, National Information Society Agency, 2008)

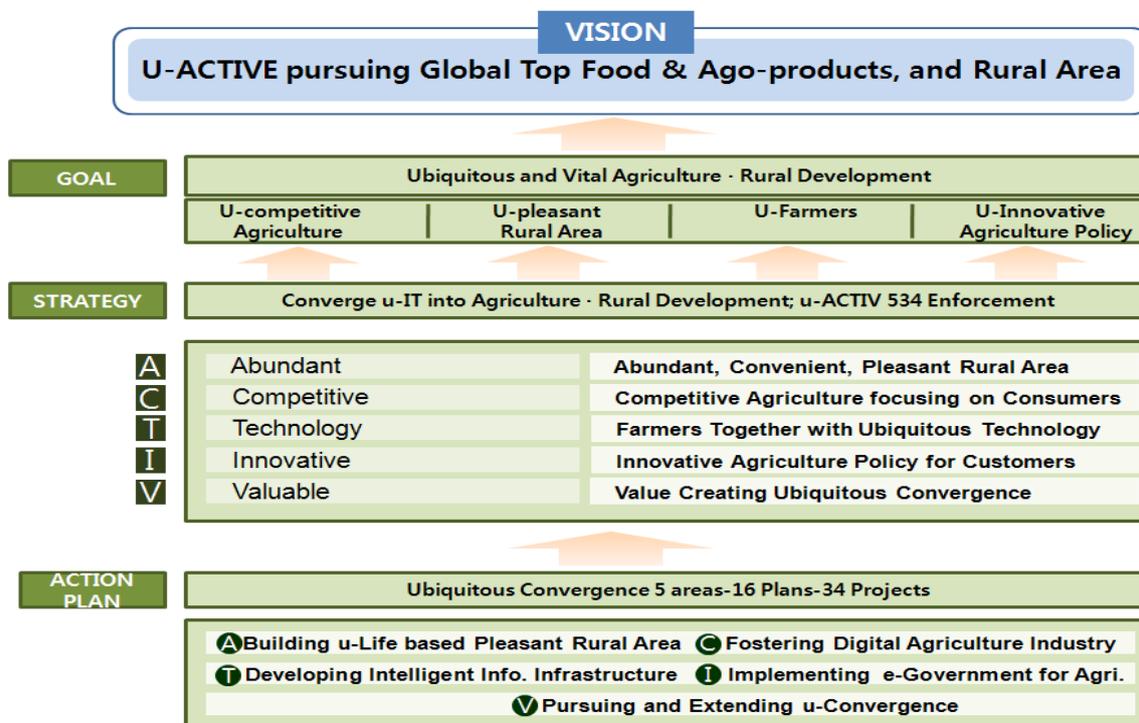


Figure 4. Vision and Goal of Agriculture/Rural Informatization

(Source: Agriculture/Rural Informatization Basic Plan, MIFAFF, 2006)

importance of the agriculture and rural community

be sufficient, which is not a simple problem to

them.

Currently, MIFFAF is reconsidering the role of AFFIS (Center for Agriculture Forestry Fisheries Information Service). As discussed earlier, AFFIS has been doing well for agriculture/rural informatization in Korea. However, business environment has been changed since 2000. To date, the core competence of AFFIS is to provide diverse useful information for farmers via the portal site, and present education opportunities for farmers. Currently, there exist more than these kinds of expectation from farmers; many of them graduated from collages and their business is not limited to

mere cultivation. They want professional business consulting rather than just management or technical education. In addition, some people raised a question, "Is it necessary for AFFIS to operate the portal site for Farmers? It can be outsourced in lower cost." What will be AFFIS' future core competence?

Acknowledgement

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