

Smart Farm Policy in Korea¹

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Introduction

Promotion process of smart farm policy

The Smart Farm government policy started with the rapid opening of the oversea market opening with trading economies such as the US and the EU and the greenhouse aging has progressed rapidly. In the agricultural sector, since 2004, R & D for agricultural and ICT convergence has expanded and begun to pursue various policies as follows.

During the period of 2004 and 2009, the government carried out the ‘u-Farm’ leading business and successfully operated 25 models. Through this project, Korea achieved visible results that confirmed the possibility of integrating agricultural technology and IT technology such as implementation of optimum growth conditions using sensor and traceability system using electronic tag. The most popular field of model development is facility horticulture, and some items such as tomato and paprika have reached an advanced technological level. In the livestock sector, core facilities and operation models such as feed automatic feeding system, especially pig farming, have entered the field application stage. In addition, in order to enhance international competitiveness, the facility modernization project was fully endorsed when the Korea-US FTA was concluded in 2007 as a part of the domestic supplementary measures in the agricultural sector. An investment fund of 500 billion won for 10 years (2008 ~ 2017) on the modernization of the vinyl greenhouse and the like. As a result, the smart farm models that can be spread to agriculture field has been established with the support of R&D related to agriculture and ICT fusion complex, and the government has begun to focus on agriculture 's smartization since 2013. As a part of the policy, the government have established measures to disseminate agro-food ICT fusion, diagnosed the ICT convergence status by sectors such as production, distribution and consumption, and set a clear direction in promoting smart farm distribution, R&D and industrial environment.

Smart farm policy objectives and directions

The government's Smart Farm policy has multiple goal. First, by expanding smart farm adoption and improving productivity of smart farm farmers, the government aims to establish smart farms to a total of 4,000ha of facility horticulture (40% of facility modernization area), 700 livestock farms (10% of full-time farmers), and 600 fruit farms (25% of scale farms) by 2017. Specifically, the government plans to upgrade our global competitiveness by upgrading 600ha of glass greenhouses centered on paprika, tomatoes, and flowers, which are items of

¹ This section is compiled from the Ministry of Food, Agriculture, Forestry and Livestock, Ministry of Agriculture and Rural Affairs, Interim Report of the National Agricultural Cooperative Federation - Fusion of agriculture and ICT, Proliferation of Korean smart farms, 2016.

strategic importance for export. The livestock sector plans to gradually develop models for poultry and cattle, gradually expanding to 700, which is 10% of livestock farming industry. The non-agricultural sector plans to expand to more than 600 hectares, which is 25% of farmhouses (2,582 farms) with more than 1.5 million hectares of farm products and sales of farm products of more than 100 million won. Second, it will create a virtuous cycle ecosystem in which related industries develop simultaneously based on government investment and market expansion for smart farms. To this end, the government plans to support the establishment of facilities such as facility installation, which will lead to the expansion of the market so that the competitiveness of the related companies can be enhanced and the industry can enhance to the export industry.

The government's smart farm policy direction is as follows: First, it will promote the facility modernization project and smart farm promotion, expanding the foundation for the introduction of ICT convergence facilities and easing the investment burden on farmers. Second, it aims to encourage farmers to voluntarily introduce smart farms by objectively analyzing and promoting productivity improvements and reductions in labor force resulting from the adoption of smart farms. Third, localize and standardize the core parts and technologies of smart farm such as related equipment and growth management, and make and distribute Korean smart farm model that suits our agricultural environment and conditions. Fourth, farmers and related personnel will have the ability to utilize ICT and specialize in small items to support 100% of the benefits of smart farms in the field. In addition, it supports the core functions such as A / S, which are necessary for farmers but cannot be met by the government, at the government level, thereby solving the difficulties of the farmers and establishing a platform for the related companies to grow.

Smart farm supply situation

ICT usage of facilities

The scale of ICT adoption by all agricultural facilities in Korea is still very low. According to the result of survey on the status of registered facilities in agriculture management (Ministry of Agriculture, Forestry and Livestock, 2015), the number of farms in ICT facilities is 2,625, which is only 1.7% of farms in total facilities. The area of ICT introduction facilities is 1,258ha.

Table 1. ICT Facilities situation

unit: household, parcel, building, ha, %

	farm house hold	No. parcel	No. building	Area
Total Ag. Facility(A)	151,496	311,025	318,604	64,528
ICT Facility(B)	2,625	5,686	5,749	1,258
ratio(B/A)	1.7	1.8	1.8	1.9

Source: Survey on the status of agriculture facilities registered by the Ministry of Agriculture, Forestry and Fisheries (2015)

By type of ICT facility, vinyl is the highest at 85.5%, followed by glass greenhouse at 9.3%, cultivator at 3.9% and hard plate at 1.4%. Of the total greenhouses, ICT installed glass greenhouses account for 35.4%, while vinyl greenhouses are only 1.6%. Considering the

relatively high crop productivity of greenhouses, farmhouses with greenhouses have farmhouses with vinyl greenhouses It is considered that there is a great incentive to introduce ICT facilities.

Table 2. ICT facility by type ratio

	Total	glass	hard plate	vinyl	cultivator
Total Facility(A)	318,604 (100.0)	1,506 (0.5)	673 (0.2)	310,413 (97.4)	6,012 (1.9)
ICT Facility(B)	5,749 (100.0)	533 (9.3)	79 (1.4)	4,913 (85.5)	224 (3.9)
B/A	1.8	35.4	11.7	1.6	3.7

unit: No. building, %

Source: Survey on the status of agriculture facilities registered by the Ministry of Agriculture, Forestry and Fisheries (2015)

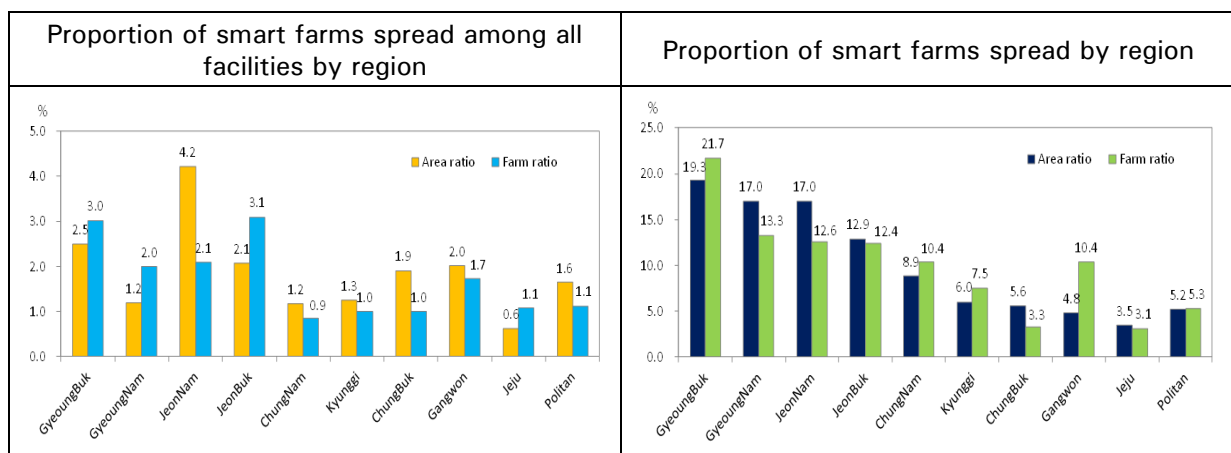


Fig. 1. Smart Farm Supply Situation

Source: Survey on the status of agriculture facilities registered by the Ministry of Agriculture, Forestry and Fisheries (2015)

The proportion of introduction of ICT facilities compared to the total facility area by province is very low, less than 4.0% of both land area and number of farm households. Smart farm penetration rate compared to facility cultivation in Gangwon area is 2.0% and 1.7% in terms of area and farm households, respectively, which is similar to the national average. On the other hand, the share of smart farms by region is the highest in Gyeongbuk area (19.3%) and farm household number (21.7%). Gangwon area occupies 4.8% of area and 10.4% of farms. However, the area of smart farm cultivation in Gangwon area is significantly lower than the national average of 48%, suggesting policy efforts to expand the production base of Smart Farm in the future.

Table 3. Smart farm status by facility horticulture level

unit: ha, Household, %

Level		Area	No. farm household	Scale	Main Products	Main facility	Origin
upper	Advanced type	394	305 (29%)	1ha Over facility horticulture complex etc.	paprika, tomato (water culture)	Complex Environment Management + Renewable energy facility	Domestic 30% imported 70%
Middle	Complex management	334	668 (64%)	0.5 ~ 1ha horticulture facility (continue)	Strawberry, cucumber, melon, tomato(soil culrue)	Complex Environment Management	Domestic 72% Imported 28%
Lower	Easy management	41	74 (7%)	0.5ha below single house	melon, water melon etc.	Simple Environment Management (Ventilation + warming + heating)	Domestic 100%
sum		769	1,047				

Source: Survey on the status of agriculture facilities registered by the Ministry of Agriculture, Forestry and Fisheries (2015)

The smart farm level of facility horticulture can be classified into advanced type (upper), combined management (middle), and simple management (lower). Advanced smart farms are being introduced into export horticulture production facilities with a facility size of more than 1 ha, including complex environmental management and renewable energy facilities. In the case of complex management, it is spreading to general horticultural facilities of 0.5 ~ 1ha size interlocking type, and ICT is used to control complex environment management and energy saving. Simple management is introduced in small facilities of less than 0.5ha, and ICT is used to control the growth conditions such as ventilation, warming, and heating. The main items are melon and watermelon, and they use 100% domestic smart farm.

Table 4. Use of smart farms by facilities & item

Unit: ha, %

	Paprika	Tomato	water-melon	Strawberry	Cucumber
facilities area	738	5,329	9,767	5,386	2,804
smart farm area	265	216	102	67	65
ratio	35.9	4.1	1.0	1.2	2.3

Source: Survey on the status of agriculture facilities registered by the Ministry of Agriculture, Forestry and Fisheries (2015)

The smart farm area is only 2% of the total area of the main items in the horticultural sector. By item, paprika was the highest at 35.9%, followed by tomatoes 4.1%, cucumber 2.3% and strawberries 1.2%. The higher the export competitiveness and the longer crops, the higher the smart farm penetration rate.

Table 5. Use of smart farms by facilities & item

unit: House hold, %

	Hanwoo	Dairy	Pig	Hen	others	Total
Total farm	98,372	8,454	4,991	42,004	2,172	155,993
Smart farm	1	37	179	40	2	261
ration	0.0	0.4	3.6	0.1	0.1	0.2

Source: Survey on the status of agriculture facilities registered by the Ministry of Agriculture, Forestry and Fisheries (2015)

According to a survey by the Ministry of Agriculture and Livestock (2015), there are 261 Smart Farm-introduced farms in the livestock sector. The share of farms adopting smart farms is lower than that of facilities and horticulture in other types of pig farms. However, compared to 2014 (30 ~ 40), the number of smart farm-introduced farm households in the livestock sector is expected to expand rapidly.

Policy Implications

In this section, I would like to suggest policy implications for establishing the smartization strategy of the Korean enrichment industry through the actual situation of smart farm distribution in Korea and the example of leading farmers.

First, in order to increase productivity and increase competitiveness through smart farm, it is necessary to develop ICT fusion equipment in accordance with the size of items and farms, develop programs for systematic education and educate experts.

Second, there is a need to expand opportunities for field experience so that potential farmers who are willing to adopt smart farms can facilitate decision-making.

Domestic Smart Farm is still in its initial stage of settlement, but leading farmers have achieved visible business performance after ICT introduction. Therefore, strengthened educational programs utilizing them will solve the psychological barriers to ICT fusion of smart farm farmers.

In terms of policy, it is necessary to designate and operate on-site training farms selected from excellent farmers, and to provide incentives for strengthening the policy linkage of leading farmers.

Third, the benefits of ICT fusion system to farming activities range from simple environmental management to complex environmental management, energy saving and renewable energy. In order to leap into hardware-oriented ICT convergence and to become a fourth ICT industry in agriculture, smartization is needed in the value chain area of post-production such as distribution, processing, marketing, and consumption. It is necessary to supply software that can utilize the information of the consumer market such as the purchase pattern, payment price, and preference of the consumer accumulated through the direct sales distribution and the data of the growing environment of the crop or livestock accumulated through the introduction of ICT into the farm management.

Finally, farmers adopting smart farms in the horticulture export complexes have secured export competitiveness through improving the productivity and quality of agricultural products. This is an opportunity to create high added value of Korean agriculture in the sense that it can link with the government's policy to encourage the export of agricultural products and to open a new market for agricultural products.

Reference

Ministry of Agriculture, Forestry and Fisheries(2015), Survey on the status of agriculture facilities registered.

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