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A Case Study on Smart Concentrations Using ICT Convergence Technology

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Abstract

'4th Industrial Revolution' is accelerating as a core part of creating new growth engines and enhancing competitiveness of businesses. The fourth industrial revolution means the transformation of society and industries that are brought by IoT (Internet of Things), big data analysis, AI (Artificial Intelligence), and robot technology. Information and Communication Technology (ICT), which is a major factor, is affecting production and manufacturing systems and as ICT technologies become more advanced, intelligent information technology is generally utilized in all areas of society, leading to hyper-connected society where new values are created and developed. ICT technology is not just about connecting devices and systems and making smart, it is about constantly converging and harmonizing new technologies in a number of fields and driving innovation and change. It is no exception to the agro-fisheries trade. In particular, ICT technology is applied to the agricultural sector, reducing labor, providing optimal environment for crops, and increasing productivity. Due to the nature of agriculture, which is a labor-intensive industry, it is predicted that the ripple effects of ICT technologies will become bigger. We are expected to use the Smart Concentration using ICT convergence technology as a useful resource for changing smart farms, and to help develop new service markets.

Keywords: *Smart concentrations, ICT convergence technology, Artificial intelligence, and Optimal technology.*

1. Introduction

Information & Communication Technology (ICT) is a combination of Information Technology (IT) and Communication Technology (Communication Technology, CT), which means all the software technologies needed to manage the operation and information of the hardware and devices of the information device, and how they are used to collect, produce, process, preserve, and utilize information. ICT is the foundation of a creative economy that enables the connection of not only humans but also between humans and things and things. With the introduction of high-tech products such as smart home appliances, smart farms, smart beauty, and smart health technologies that utilize ICT technologies, a growing shift in new industries is

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creating convergence synergies between technologies and accelerating the development of smart ICT products and services. As these ICT technologies are applied to manufacturing processes and innovations in high-tech manufacturing industries such as 3D printing take place, they have entered an era of infinite competition where competition between countries becomes fiercer. [1] Smart ICT is composed of contents, platforms, terminals and networks, and evolution and convergence of future core technologies will affect the speed of development of smart ICT. [2] As the industrial ecology moves toward new foodstuffs, the paradigm of agriculture is changing with the emergence of smart agriculture using ICT convergence technology in biological-based technologies. Agriculture, in particular, has become a future growth industry, and is evolving into a variety of forms that were never imagined before due to the collusion with ICT. The past industrial revolution has changed the lives of mankind and agriculture needs a future response to avoid the relative alienation of the past. [3] ICT convergence technology, combined with agriculture, creates advanced and new value along with the development of agriculture.
Successful cases in the agriculture sector, including smart farm and smart farming, which are covered in this paper, will affect the innovation of advanced agriculture and the development of smart ICT, which are adapted to the era, and are expected to contribute greatly to the development of the smart ICT era.

2. Main text

2.1. ICT based agricultural field

The problems of agricultural production stagnation, decline of rural labor force, aging, and climate change are emerging as major tasks in our agriculture sector, and agriculture and ICT integration and integration are emphasized as solutions to these problems. In particular, the application of ICT technology in the agricultural sector has reduced the labor force and provided the optimal environment for the crops, so productivity is increasing. By eliminating the effects of nature, fresh crops can be obtained at any time, regardless of the season or place. The use of pesticides, fertilizers, and water is cut through automation and the risk of natural disasters is reduced. The results show that the use of ICT is effective. In the case of smart farms, the labor needed for the field is reduced, high-quality crops can be produced, and damage from pests and abnormal temperatures can be prevented. In addition, it provides an optimal environment for crops and can raise income without hurricane, so the production per unit area is remarkably high.

The only Smart Farm in Korea, which is located in Giga ısland, Imjado, in Figure 1, can monitor crops in real time and automatically control the temperature and humidity at any time and place, as well as automatically opening and closing house facilities in smart devices. It is possible to experience local ICT by cultivating local specialty products and using complex environmental control system and video control system. The complex environment control system collects data through the temperature and humidity sensor installed in the vinyl house, and it can check the sunshine according to the temperature while checking through the smartphone or smart watering according to the humidity, and respond to the growing environment in real time. In addition, farms can be managed remotely via smartphones anytime, anywhere, even if they are not in the field of experience.

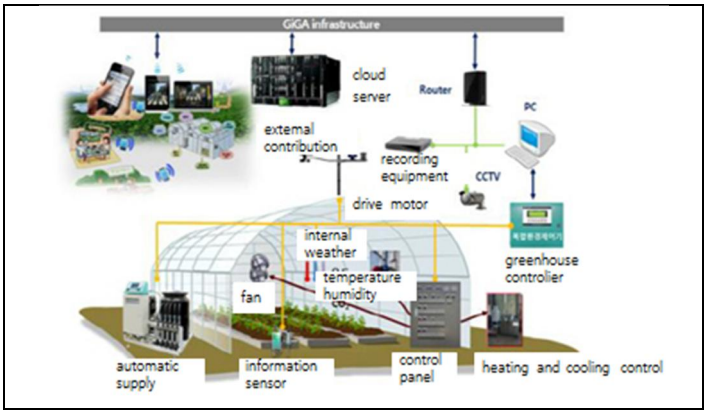


Figure 1. Smart farm service configuration < Source: KT provided >

The video control system manages the entry and exit of the smart farm through the zoom function CCTV, and can precisely observe the growth status of the crop and the occurrence of the pests. It is clear that 'smart farm', a smart ICT education site, is a future growth engine that can enhance agricultural productivity and competitiveness.

2.2. An example of Chungnam agricultural and livestock industry using ICT

Dangjin in Chungcheongnam-do, Korea, is applying the new technology using ICT, which can be applied to the field in accordance with livestock farming situation such as milking line ICT, in the field of animal husbandry. Using milking line ICT using ICT Milk quality improvement, improvement of crude oil quality, IT utilization, ICT utilization Slaughtering technology, fostering of nursery pig feedstuffs, control of automatic pig farming using ICT. Monitoring, analysis, control, production (including temperature, humidity, power outage, fire, etc.) environmental monitoring equipment, automatic remote control such as automatic feeder and water management system, And ICT equipment such as information systems for management and management. As a result of this ICT application, it is possible to prevent livestock diseases while reducing the amount of feed and labor, increasing the flow rate and pregnancy rate, raising the competitiveness of livestock industry and income of livestock farmers. It is predicted that if the big data such as growth information, individual health status and housing environ information are utilized in the livestock sector through the facility that is combined with ICT, the problem of the livestock field will be solved by the optimal specification management.

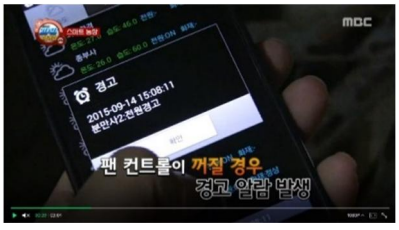
Figure 2. ICT application site < Source: Daejeon Today >

Figure 3. Utilizing ICT for automatic feeding of mother pigs < Source: News1 >

2.3. An example

The example of a farm that is managed in real time using ICT in Table 1 shows the development of ICT technology for the environment, from automatic measurement of feed and sound quantities. (a) is an automatic feed that automatically supplies a certain amount of food. (b) can be checked real time with a smartphone such as a volume meter and feed intake meter. (e) installs a system to monitor the environment and monitors the fan control separately, (f) is not switched off when the fan control itself is turned off, (g) is a warning alarm, (h) is a pleasant smell in the air purifier.

Table 1. Case study of pig farm using ICT

a 	b 	c 
d 	e 	f 
g 	h 	i 
j 	k 	l 

< Source: MBC Power Magazine 2015.9.18 >

The future growth of farming continues. It is urgent to conduct research on eco-friendly energy through the decomposition of livestock after incense, and smart farming will be developed through efficient eco-friendly fuels. In addition, real-time temperature, humidity a of experience. ICT system development are very important through program improvement for remote control. [4]

2.4. ICT-based Smart Farm Farm Example

A livestock test site in Gyeongsangnam-do can check biometric information of cows in real time after injecting 'bio capsules' into the cows in the test area. By deploying commercial technologies that utilize IoT for the first time among livestock research institutes nationwide in practice, it is contributing to the development of livestock production as early detection of diseases, modification period, and pre-predict of delivery signs are possible. Smart livestock is operated by applying ICT technology to the cow meat in the test site. This is an ICT-based management system that enables preemptive measures against abnormal objects by checking the breeding minute and disease management using the Internet of Things in real time to improve early detection and breeding performance of cattle.

Figure 4. Field staff to verify with app

< Source: Gyeongnam Livestock Experiment Station >

The management system uses mobile network providers' IoT-only 'LoRa (Low Power Wire Chip)' network to check the history and biometric information of cattle within a 2-kilometer radius and send them to PCs or smartphones to help farmers conveniently manage the disease symptoms, detection of cattle, and prediction of fertilized eggs and delivery. Its past experience and unremitting efforts are innovative compared to whether or not it will be productive or not. When the bio-capsule with the IoT communication module attached to the cow is oral, the system stays in the cow's semi-cold state while exploring the cow's body temperature change pattern, which informs the cow's health abnormality, stopping speed, and delivery signs in advance. For example, if 38.5 degrees Celsius is normal for a cow, a slight fever of more than 39

degrees can be detected continuously for more than 10 hours to indicate the onset when the temperature returns to normal. On the other hand, the temperature drops at least 24 hours before the delivery time of delivery can be predicted.

Figure 5. Biocapsule
< Source: Gyeongnam >

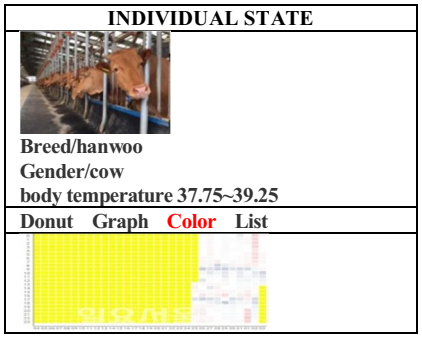


Figure 5. Thermal color of the crystallization object (app screen)

In addition, if an inflammatory reaction occurs due to a disease, a high temperature of 40° C or higher is detected early, thus prompt action is possible. All of these events take place in real time through big data analysis based on cow body temperature. It is expected that real-time notification messages will be delivered to objects that have been modified by checking the temperature, activity and negative number of bio-capsules in the stomach of cows, thus reducing the fertility rate and long period of coherence that are usually visible to the naked eye. The development of smart livestock production based on ICT was very positive in the aspect of cancer production management, and the development of a system to manage healthy cattle by maximizing calf production efficiency and early detection of disease by accurately identifying the correct time after incense.

3. Conclusion

This study is a study on Smart Livestock using ICT fusion technology, and suggests direction of livestock farming through case analysis of livestock sector operated by ICT technology. First of all, ICT in Dangjin city in Chungcheongnam-do Province, which integrates ICT-based agriculture site point of view with the field of Livestock farmers, and real-time farm management using ICT, And the superiority of the improvement effect was confirmed. As a result of applying ICT technology to the agricultural sector, the labor force is reduced, the environment is optimized for housing, and productivity is increasing. The impact of the new ICT technology is expected to increase gradually due to the nature of agriculture, a labor-intensive industry. The Hyper-Connected era means that all objects, processes, and data, including people, are connected to the Internet, and the range of connections will be extended by interaction with various objects. In the future society, it is important to conceptually define the sum of all the data for the individual, and to design the mobile environment and platform for the individual to design the operating system. In order to strengthen the competitiveness of smart agriculture linked with ICT in the changing future through researches, we need the following strategy. First, accurate data collection and analysis of ICT data for smart agricultural development is needed. Data analysis technology and data acquisition channels are important for smart growth of agriculture that is rapidly growing with advanced ICT technology, big data, SNS and smart sensor. The analysis technology that deduced various complex information from the simple measurement data of the sensor by diversification applies the ICT technology to the agricultural field in particular, and the labor force is reduced, the optimum environment for the agricultural industry is provided,

and the productivity is gradually increasing. Second, we must always present a 'creative strategy methodology' to create new innovative products in terms of consumer-oriented marketing strategy. Continuous efforts are needed to find creative strategies that can bring out better ideas, such as providing convenience and efficiency in the everyday life of customers using mobile, wearable, and virtual reality technologies. Third, it is necessary to nurture and develop livestock manpower for ICT fusion technology. Gilman through professional nurturing can be seen as a shortcut to prepare for the constantly developing agricultural field.

In the case of the livestock farm introduced with the ICT convergence technology announced through the paper, it can be seen that the labor force is reduced, the optimal environment is provided, and the productivity is gradually increasing. The impact of ICT's new technology is expected to increase gradually due to the nature of the livestock industry, a labor-intensive industry. We hope that this study will be useful for smart agricultural and livestock industry, which is gradually changing, through research on smart farming case utilizing ICT convergence technology, and will help to pioneer new service market. I intend to further investigate the detailed analysis and investigation for the growing ICT industry and the growing ICT industry.

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