

## A Study on the agricultural supply adjustment models using NFC

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**Abstract.** For measures on the stable supply of agricultural products, exchange of information between producers is essential. Through this, the producers can adjust the seeding amount during the seeding phase to achieve the stable supply of agricultural products. However, with sluggish exchange of information, sharing of information between the national producers seems distant. In order to solve this problem, this paper has proposed the management system model for the agricultural products utilizing NFC.

**Keywords:** We would like to encourage you to list your keywords in this section.

### 1 Introduction

The problems related to the stable pricing of agricultural products are one of the pending issues not just for our country but for the global society. In the case of the United States, starting from the 1933 Agricultural Adjustment Act to the Agricultural Law of 2008, they have been trying various ways to achieve these objectives but the fact is that they still lack the essential measures against price fluctuations of agricultural products that are recurring every year. The reason is that vegetables and fruits are difficult to store and the supply and demand is affected by the environment such as climate and natural disasters, so the price is particularly unstable as has speculative nature [1].

For a stable supply of agricultural products, if sharing of information from the seeding phase and the prediction on the expected sales price can be provided in a real-time basis, controlling the most of the factors within the predictable range can be possible excluding the factors from climate and natural disasters.

Therefore, establishing fundamental measures for a stable supply of agricultural products are necessary, and to achieve this, a variety of IT technologies, utilization of human resources and the structuring of the system through the interlocking of administrative network of producers, government and municipalities are required[2][3].

This study was conducted with the purpose of proposing a model that promotes the coexistence of producers, distributors and consumers by establishing fundamental measures for stable pricing by systemizing the domestic agricultural production management system using the NFC [4].

## 2 Near Field Communication

As existing RFID service uses one-way service such as tracking of history, logistics and distribution, etc., NFC can enable two-way communication so it is being applied to a variety of applications such as mobile access technologies, personal information certification, mobile advertising and healthcare, etc.

NFC as one of the RFID types is a technology for exchanging the data between the devices within close proximity of 10cm or less using the 13.56MHz frequency band, where it does not use the network of operators but communicates directly between the devices and support not only reading of information but also writing as two-way communication.

With the advancement of RFID technology, the distance has expanded to a maximum of 900m including the passive type and active type, and by applying the reader and tag concept according to the business model, the utilization range is expected to expand greatly.

### 2-1. Operation Mode of NFC

The Figure 1 represents the operating mode of NFC. The operating mode of NFC is divided into three modes. First is a P2P mode (Peer-to-Peer Mode) where it supports the communication by linking two NFC devices. The pairing process of Bluetooth was replaced with NFC technology with simplified connection procedure during the initial phase. Two mobile phones work as a card reader to transfer the data between one another and have large power consumption [5].

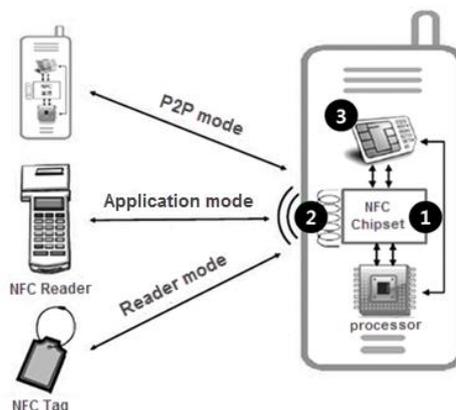


Fig. 1. The operation mode of NFC

Second, the reader model (Reader/Writer Mode) of NFC device can read and modify the data stored in the NFC transponder. Like the NFC tag information on the controlling target, the user can inquire on the information through the NFC device by reading the tag. When touching the NFC mobile device in the tag holding the URL address, URL address is then read and the website is accessed.

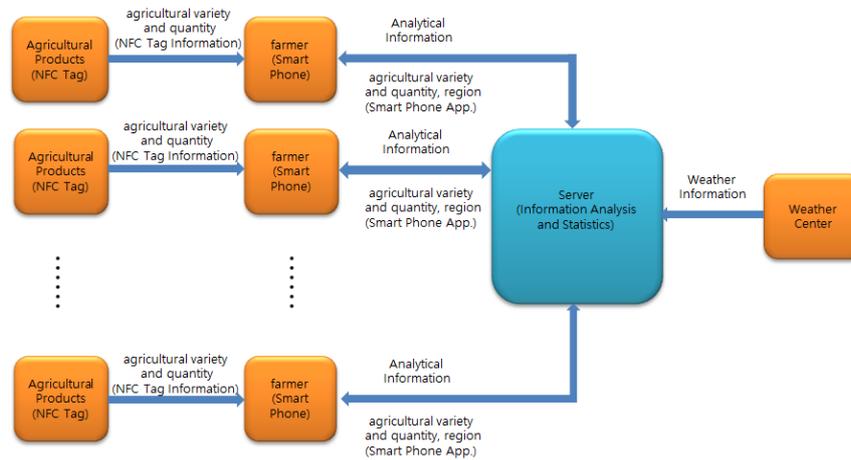
Third is a card emulation mode where NFC device operates like a SCART card (ISO 14443) so the external NFC device cannot distinguish the smart card and NFC device. In this mode, non-contact payment and ticketing service are possible. In the real-time range control system, the authentication can be performed by transmitting the tag information of mobile NFC reader to the server-side to ensure safer and convenient log-in procedures.

### 3 The System Model for Proposed System

Table 1 is showing the technological difference between the NFC and the short-distance wireless communication. Using the NFC technology being utilized in various fields, digital information of agricultural yield was made possible which was unable to predict until the actual time of harvest, and in addition, through the processing of obtained information, the price fluctuation of agricultural products which occur frequently can be prevented by predicting the quantity of agricultural products being produced each year.

	<b>NFC</b>	<b>RFID</b>	<b>Bluetooth</b>
<b>Setup time</b>	<0.1s	<0.1s	<6s
<b>Range</b>	10cm	3m	30m
<b>Usability</b>	-. Easy Human Interface	-. Item Interface -. Easy	-. Data Interface -. Easy
<b>Case of use</b>	-. Payment	-. Item pursue	-. Data exchane
<b>Consumer experience level</b>	-. Easy connecting and touch	-. Require information acquisition	-. Require Network

The Figure 2 represents the scenario for the supply-demand measures utilizing the NFC proposed in this paper.



**Fig. 2.** The Block diagram for proposed system model

It is a model that collects the amount of seeds used during the seeding utilizing the NFC built-in to the smartphone used by most of the people, and predicts the quantity of agricultural products which can be harvested using the weather and climate information provided by the Meteorological Agency.

### 3-1. Information collection model

Information on the types and quantities of agricultural products seeded by the producers is gathered by reading the seed or packing having NFC tag. Information collected through the smartphone is related to types, quantity of seeds and area of agricultural products. When such information is delivered to the web server using the smartphone application, the web server manages the types and quantities of agricultural products seeded nationally and in regional level. In addition, collected information provides feedback to the national producers allowing the producers to control the seeding quantities. And utilizing the weather and climate information provided by the Meteorological Agency, the model allows controlling the harvesting time and releasing time with the prediction of harvest quantities for entire agricultural products for the corresponding year.

## 4 Conclusion

In this study, a model that can prevent the price fluctuation of agricultural products that are repeated each year was proposed. It is a model that combines and manages a variety of information on the agricultural products collected through the producers. It is a system that delivers the types and quantities of agricultural products being seeded by the producers to the shared by the others in a real-time basis, and in addition, it prevents the price fluctuation which may occur in the future by predicting the quantity of agricultural products which can be produced for the year. In addition, using the NFC tag which is cheap and can be easily used to collect the agricultural information and the smartphone have by the most of the citizens, the types and quantities of agricultural products can be collected to be sent back to the producers to induce the controlling of production capacity, and in return, it can prevent the price fluctuation of agricultural products that are frequency occurring by predicting the annual harvest quantities.

This study was conducted with the purpose of proposing a model that can promote the coexistence of producers, distributors and consumers by establishing fundamental measures for stable pricing of agricultural products by systemizing the domestic agricultural production management system.

## References

1. C. H. Lee, 'Strategies & Currents on traceability of Agriproducts in Korea', The Korean Journal of Pesticide Science (2005), Vol.9, No.1, pp.11-22
2. Korea Rural Economic Institute, Policy workshops for structural improvement measures complement the Agricultural Marketing, Korea Rural Economic Institute (2003)
3. N. H. Yoo, G. J. Song, J. H. Yoo, S. Y. Yang, C. S. Son, J. K. Koh and W. J Kim, 'Design and Implementation of the Management System of Cultivation and Tracking for Agricultural Products using USN', Journal of KIISE : Computing Practices and Letters (2009), Vol. 15, No. 9, pp.661-674
4. A. Mainwaring, J. Polastre, R. Szewczyk, D. Culler, J. Anderson, 'Wireless Sensor Network for Habitat Monitoring,' Proceeding of ACM International Workshop Wireless Sensor Networks and Applications,(2002), pp.88-97
5. <http://nfc-forum.org/what-is-nfc/about-the-technology/>