

## Design and Implementation of Agricultural Products Trading Application

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**Abstract:** Following the recent hike of the Smartphone use, applications with diverse purposes have been developed and provided to users. In case of agricultural products, seeing the actual products before buying them was conventional in the past. However, the on-line trading of agricultural products is also increasing these days, which have different characteristics from the industrial products. This paper designed and implemented an application for trading agricultural products that connects between producers and consumers of the agricultural products. The application developed in this paper addressed some of the shortcomings of the similar existing applications and differentiated functions were applied under the goal of helping more and more users make reasonable decision when buying and selling agricultural products.

**Keywords** –Android, Farmer System, Mobile Application, Web Contents, Web Service

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### I. Introduction

According to the National Nutrition and Nutrition Survey in 2011, the amount of daily intake of fruits and vegetables among men and women over the age of one was 160 g, which falls far short of the recommendation of 400 g by the World Health Organization [1]. In particular, both the amount of and proportion of eating fruits and vegetables decreases as the age gets older [2]. In today's society where obesity and adult disease has become serious social problems, eating fresh and healthy vegetables is being more and more emphasized. Fruits and vegetables are preventive diet for various cardiovascular disorders and chronic diseases such as cancer. Previous studies reported that obese people have insufficient intake of fruits and vegetables. In this situation, people's interest in eating fruits and vegetables is increasing these days [3][4]. According to the 'Analysis on the Consumption Trend of Agricultural Food' by the Rural Development Administration, the amount of purchasing agricultural food excluding dining out increased recently in all family types except for double-income family consisting of two people [5]. As a result, consumers who wish to have fresh agricultural products try to buy agricultural products from diverse platforms and producers are now searching for the rationalization of distribution channel that can guarantee larger profit to the producers than the conventional wholesale distribution [6].

Following the expansion of e-commerce market, the on-line agricultural food market that can satisfy the demands from both the producers and consumers is experiencing remarkable growth, with an estimated market size of approximately 8.8 trillion KRW at present [7]. The number of websites for trading agricultural products is also growing fast. Despite the current situation that the penetration of the Smartphone surpassed that of personal computer (PC) and the on-line shopping activity became rapidly reorganized centered at mobile environment, there is only a few number of applications that trade agricultural products at present, in contrast to the websites that exclusively focuses on the agricultural products trading.

This paper designed and implemented an 'agricultural products trading application' that secures safe transaction between producers and consumers of agricultural products and provides the accurate price information of the agricultural products. The user convenience was the most important factor when designing and creating the application in this paper. In addition to the basic agricultural products, the farm surpluses that used to be thrown away due to flaws are now provided to food-related businesses so that they can be used for processed food or fertilizer. Hence, the amount of waste of the farm surpluses can be diminished. Regional promotion function was added such as information on the experience event or local festival. Land parceling function is also provided so that consumers without land can directly grow agricultural products, which makes an effect of stabilizing the earning of the producers for a certain level. A voice recognition function was added for user convenience when implementing the application.

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## II. Related research

### 2.1 Survey Result

Figure 1 to Figure 3 shows some of the significant result of the survey outcome that was conducted to check the validity of developing the ‘agricultural products trading application’ in this paper. The survey was conducted from September 14th to October 2nd in 2017 using Naver survey form. The subjects were the members of the Naver mom café who frequently purchase agricultural products and the number of respondents was 154.

Figure 1 shows the priority of consideration when purchasing agricultural products. The price received the first priority, followed by place of origin, usage of agricultural pesticide, and quality. The price was the most important factor that determines the purchase of the agricultural products.

What is the priority of consideration when purchasing agricultural products?

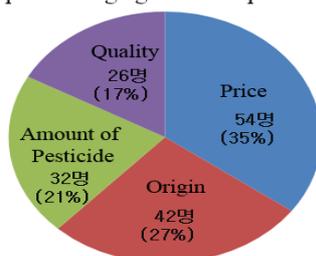


Fig.1. Survey 1

In Figure 2, the Internet or application was proven to be the most frequently used distribution channel when buying bulk of agricultural products, followed by large-scale stores. Different from the industrial products, the distribution channel of the agricultural products used to be dominated by real market where users buy products after seeing the actual product first. However, the survey result indicated that the distribution channel of agricultural products also changed to the Internet or application these days.

Which distribution channel do you use when buying bulk of agricultural products?

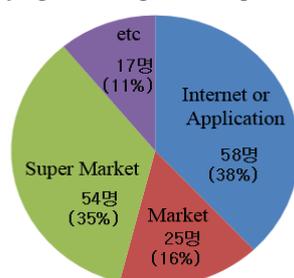


Fig.2. Survey 2

Figure 3 shows the functions that users want in applications for trading agricultural products. The users want sales of the agricultural products most, followed by purchase of the agricultural products, community, and parceling function. The survey result indicated that users want both of buying and selling of agricultural products through the agricultural products trading application.

What is the most wanted function on agricultural products dealing application?

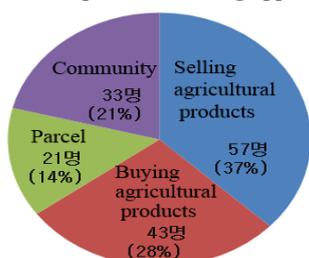


Fig.3. Survey 3

In another survey result, 81% of the respondents replied that they are willing to use an application of agricultural products trading if a new application is introduced.

Based on the survey result, this paper designed and implemented an agricultural products trading application where buying and selling agricultural products is possible and sellers and consumers directly negotiate the price of agricultural products, which is the most important factor in the purchase of agricultural products, through direct dealing so that every party can be satisfied.

## 2.2 Benchmarking

Figure 4 and Figure 5 shows the website and application that this paper chose for benchmarking. The ‘K Farmers’ in Figure 4 is an application that provides real-time production information of organic agricultural products and it largely focuses on the sale of organic food. This application has an advantage that users can track where and how the agricultural products were produced and check the satisfaction level of the consumers from the product review on the application. Considering that people these days put more and more stress on the performance/price value, this direct dealing marketplace that emphasizes organic resources has inevitable shortcoming of low price competitiveness. The application puts large stress on the production process and only a small amount of information on the product is provided.

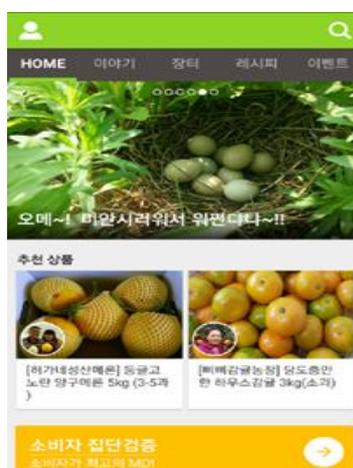


Fig.4. K farmers Application

Figure 5 shows the website of the ‘Korea-Farm,’ which is a website that sells agricultural products. The main image is sophisticated and well organized and the consumers can easily understand the products sold on the website at a glance. The website also has a strength that the menus are well allocated to prevent complexity. However, it has slow update and specific information of a product is not sufficiently provided on the detailed information page.



Fig.5. Korea-Farm PC Website

Based on the benchmarking result, this paper designed the ‘agricultural products trading application’ focusing on the provision of sufficient information and user convenience. Specifically, the consumers can check where the agricultural products are produced and view the product review. The UI was designed by applying the ergonomics such that users can understand the interface at a glance and easily use the application. Through the benchmarking, some shortcomings were found in the existing applications, including continuous update and

enhancement of detailed information page of products. These shortcomings were complemented or deleted in the implementation process of the ‘agricultural products trading application’ in this paper.

### 2.3 Production Tool

This paper used the Android Studio to create the application. The Android uses high-level language of java language and the Android kernel is based on Linux. Also, the Android contains many tested libraries and provides multimedia user interface and applications [8][9]. Android Studio is an official integrated development environment (IDE) for the Android, which is a software developed by the Google and introduced by Ellie Powers at the Google I/O Conference on May 16th in 2013.

## III. Design

### 3.1 Structured Diagram and DFD

Figure 6 shows the structure map of the overall system of the ‘agricultural products trading application.’ The application that was designed and developed in this paper provides functions of ‘advertisement,’ ‘sales/purchase,’ ‘land parceling,’ ‘community,’ and ‘login/member registration.’ In addition to the sales and purchase of the agricultural products, functions for regional promotion or land parceling are incorporated.

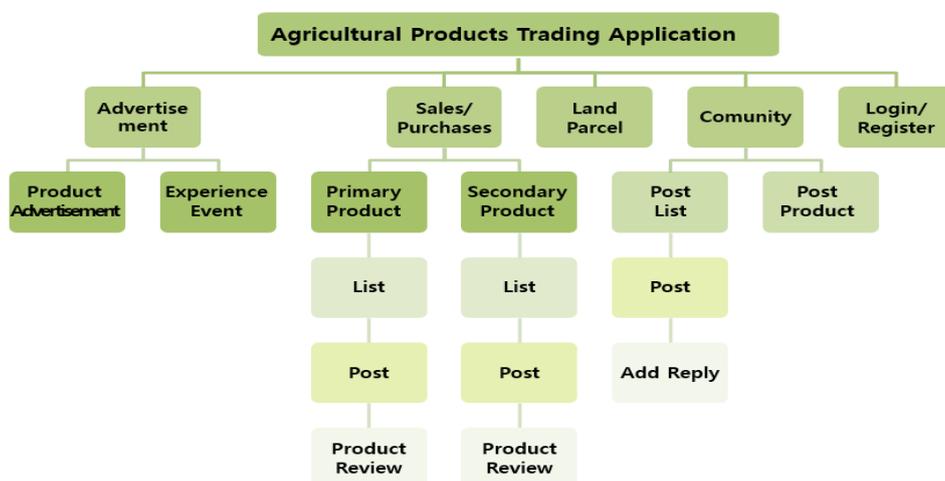


Fig.6. Structured Diagram

Figure 7 shows the entire flow chart of the system. The flow chart contains all of the functions defined in the system structure map.

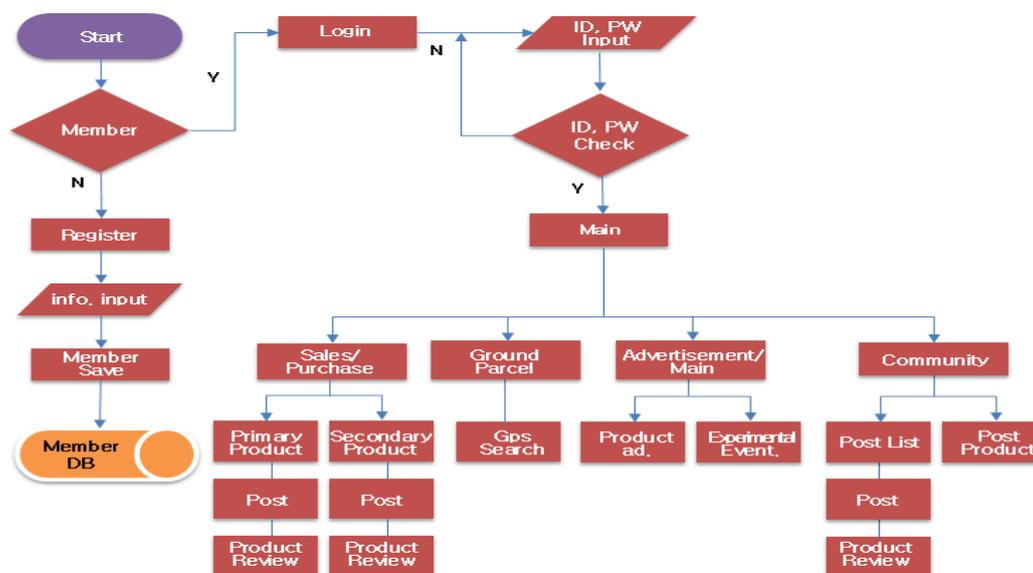


Fig.7. System Flowchart

Figure 8 depicts the top-level data flow chart. The member information is stored in the server database and the information of desired conditions is provided to the users upon request. The users can access to the ‘sales/purchase menu,’ ‘land parceling,’ ‘advertisement (main),’ and ‘community.’

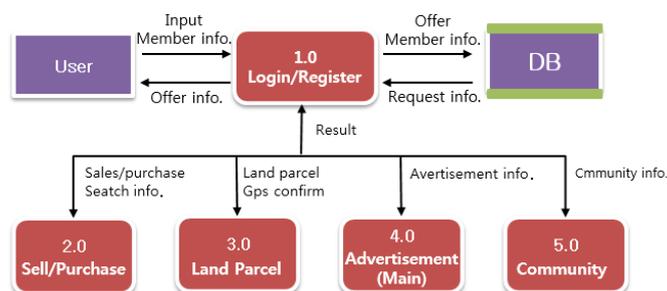


Fig.8. Top Level DFD

Figure 9 depicts the ‘sales/purchase’ data flow chart with menu regarding the sales and purchase, where users can view the sales posting of the producers. Thanks to the application of the up-to-date trend design, application users can recognize the information at a glance. The consumers can write postings of purchasing on the purchasing bulletin board to buy the agricultural products that meet their requirement.

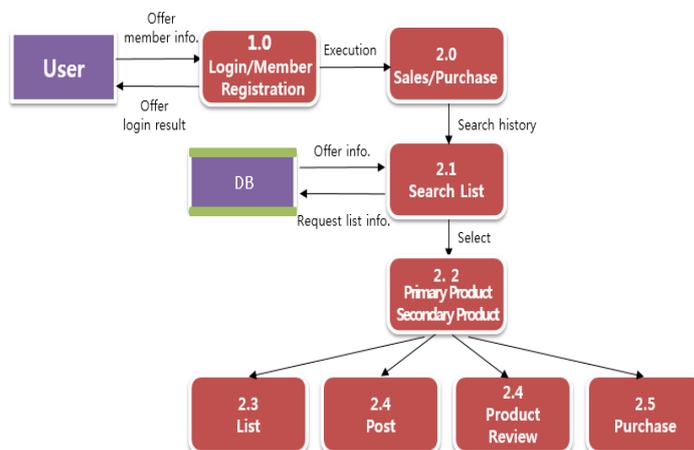


Fig.9. Sales/Purchase DFD

3.2 UI Design

Next is the UI design of the application implemented in this paper. Figure 10 shows the UI of the ‘sales’ function where users can choose the primary food and secondary food by clicking the sub menu. When they click the product picture or name, the page turns to the detailed information of the product.

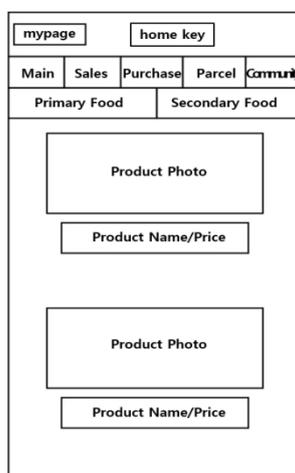


Fig.10. Sales UI

Figure 11 below shows the UI of the ‘parceling’ menu. Parceling is a function that provides land parceling to users so that either the consumers directly grow the agricultural products from scratch according to their taste or use agent producer. An agent producer is guaranteed with steady earning regardless of the good or bad harvest through contraction and consumers can be provided with products that satisfy their needs. The detailed information of the posting is shown when clicking each posting on the bottom of the UI. The application user can move to the writing page when he clicks the write button. A link to the Google map is provided along with the posting in the ‘parceling’ menu so that the consumers can look at the land they can use in detail. The posting can be verified by relevant expert within short period of time. A verification tag is attached after the checking so that consumers can be safely provided with the ‘parceling’ service.

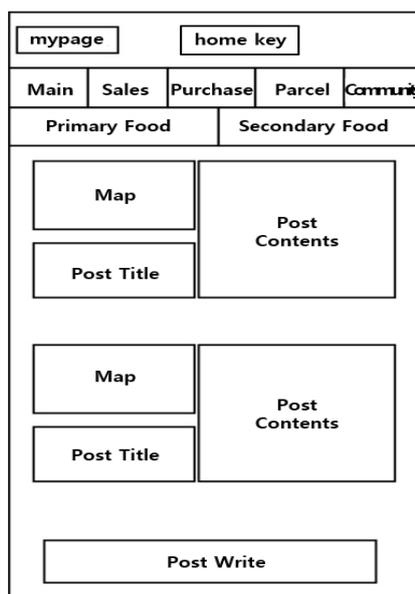


Fig.11. Parceling UI

#### IV. Implementation

The ‘agricultural products trading application’ was created based on the design described above. The pictures below show the screen of the application designed and implemented in this paper. Figure 12 shows the ‘main’ screen. By adding the voice recognition function, which was extracted from the needs analysis, the users can more conveniently use the application.



Fig.12. Implementation of Main Screen

Figure 13 below shows the implemented screen of the ‘sales bulletin’ function. The primary food menu that is provided in sub menu introduces unprocessed agricultural products. Through the provision of secondary food menu, the amount of waste of agricultural products can be decreased as the farm surpluses or flawless but

lower than top class agricultural products can be traded as well. Daily market price information of each product is provided so that the consumers can make rational decision when buying agricultural products. Users can visit the detailed information page by clicking the posted picture or the title of the posting. The detailed information page displays information about the product to the consumers, such as production area of the agricultural products.



**Fig.13.** Implementation of Sales Screen

Figure 14 shows the implemented screen of the ‘advertisement registration’ function. On the advertisement registration page, sellers can register their advertisement, which is delivered to the administrator, and payment of the advertisement fee is possible.



**Fig.14.** Implementation of Advertisement Registration Screen

## V. Conclusion

This paper designed and implemented ‘agricultural products trading application’ using Android where users can trade agricultural products. The design in this paper was based on diverse needs analysis including benchmarking where new functions that users want were added and the shortcomings of the existing applications were addressed so that the users can more conveniently use the application. The application developed in this paper is distinguished from other similar applications with its ‘parceling’ menu, ‘voice recognition’ function, and ‘chat function’ for communication among application users.

The application developed in this paper will be continuously updated. As a future research and development task, Web version of the application will be developed so that not only application users, but also PC users will use the service.

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