

A Case study for Agricultural Mobile Commerce Application Using Oauth Based Real-time Information Sharing Technique

Jung Rock Do · Ik Hoon Jang · Jin Hyeung Kim ·
Young Chan Choe

Abstract This study explains an agricultural mobile commerce case using Oauth Based Real-Time Information Sharing Technique according to the growth of the agricultural e-commerce market. Considering the characteristics of the agricultural market, it can confirm differential values with the existing agricultural mobile commerce market according to the functions and characteristics of its technique. We compare variables for introducing agricultural mobile commerce with the existing mobile commerce. Trust through information sharing with real-time farming diaries, suitability and perceived ease of use variables are positively influenced, but influence on completeness and authority of information variables are relatively insufficient. Through this, we explained differential values of agricultural mobile commerce and suggested an applicable business model.

Keywords Mobile E-commerce, Agricultural E-commerce, Social Commerce, IS Success Model, TAM

1 Introduction

As a part of the rural informatization project with the purposes of securing transparency, reducing intermediate distribution process and transaction costs in the past agricultural sector, e-commerce business models were promoted (Sunghee Park, Heabin Joe, Yehyun Shin, Yongbeen Cho & Youngchan Choe, 2014). The past e-commerce was mainly web-based e-commerce. However, the expansion of smartphones became a chance to prepare for a new agricultural e-commerce environment of mobile commerce. The mobile commerce market has been rapidly growing according to the expansion of the online e-commerce market and the improvement of IT-based technique (Youngung Lee, 2009). As of 2013, the domestic mobile commerce market scale was over 4 trillion Won (Miyoungh Baek & Sanglin Han, 2015), and 35% of smartphone users used mobile shopping (Ministry of Science, ICT and Future Planning, 2014).

This study is going to introduce a new model of agricultural mobile commerce and confirm the characteristics and roles of Oauth Based Real-Time Information Sharing Technique. We selected the factors to be considered to introduce the agricultural mobile commerce as variables and compared with the existing mobile commerce. Through this, this study is going to explain differential values of a new agricultural mobile commerce model and suggest a practical business model case.

2 Case analysis: Oauth Based Real-time Information Sharing Mobile Commerce Application

2.1. Real-time Cultivation Information Sharing System

The handwritten farming diary can cause a trust problem due to mistakes and moral hazards (Young Ung Lee, 2009).

J. R. Do · I. H. Jang · J. H. Kim · Y. C. Choe
Regional Information, Seoul National University, South Korea

J. R. Do
e-mail : dojungro79@naver.com

I. H. Jang
e-mail : iks0404@snu.ac.kr

J. H. Kim
e-mail : kijh3252@naver.com

Y. C. Choe
e-mail : aggi@snu.ac.kr (✉)

Focusing on the new change within the e-commerce environment, we developed the SNS-based application named 'farming diary-based real-time crop cultivation information sharing system' (Korea Patent No. 10-1357730). This application has the same basic structure with the general agricultural mobile shopping mall, but the farming diary substitutes explanations on products.

The purpose of developing this application is to provide an information exchange place for a direct transaction between the producers and consumers. Producers can register production information in real-time and utilize that for marketing. Furthermore, consumers can check in the mobile platform in real-time about how the crops are produced. Therefore, the Real-Time Information Sharing Technique can increase the safety and trust of crops.

The main techniques applied to this application are SNS based real-time information registration, sharing, and Oauth. The Oauth, which is a standard authentication method developed by an Open API, allows users to interwork with a new account without additional authentication. This technique enables interworking of the same information not only to this application but also to other applications (Anna Vapen, Niklas Carlsson, Anirban Mahanti and

Nahid Shahmehri, 2015).

The strength of this application is the easily interworking of information with the external platforms. When the producers upload a farming diary to the application, the contents are uploaded automatically to the external SNS and to online shopping malls. Applied to interworking technology, it can collect information that are registered in other SNS and automatically register it on the given application. Accordingly, producers can save time and costs for managing online shopping malls. Moreover, this application can apply the information of external SNS, online shopping malls and open markets.

The main screen of the application (Fig 1) is as below. The home of the application shows the product lists. When consumers choose a product list, the application moves to a product menu including product prices, pictures and product information. This is the same as the common mobile shopping mall. In addition, in case of selection of 'Real-time production Information', the information from sowing to harvesting uploaded by producers is shown. Because the growth of the products purchased by consumers can be checked, the trust between the consumers and producers can increase.

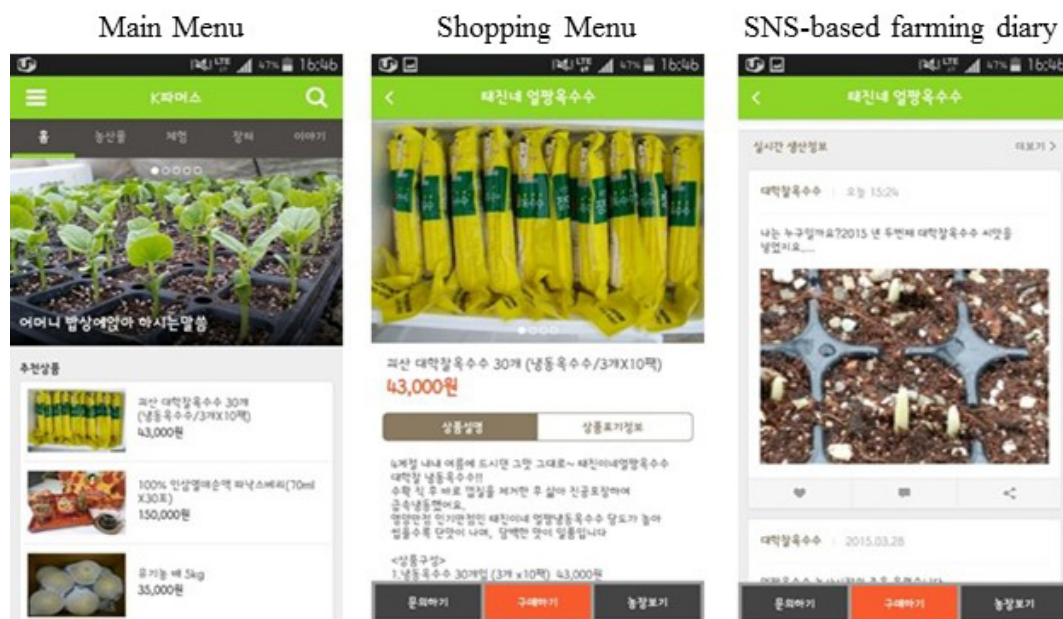


Fig. 1 The main screen of the application

The application type (Fig. 2) is basically composed of mobile shopping management (ordering, payment, delivery, etc.) and supply chain management (producer, product, operation of farming diary, SNS, etc.). As other mobile e-commerce, all transactions are introduced within the ap-

plication, and it utilized the farming diary for agricultural supply management. In addition, based on the Oauth technique, the mobile module for interworking with the other SNS provide a differentiated service against the existing agricultural e-commerce.

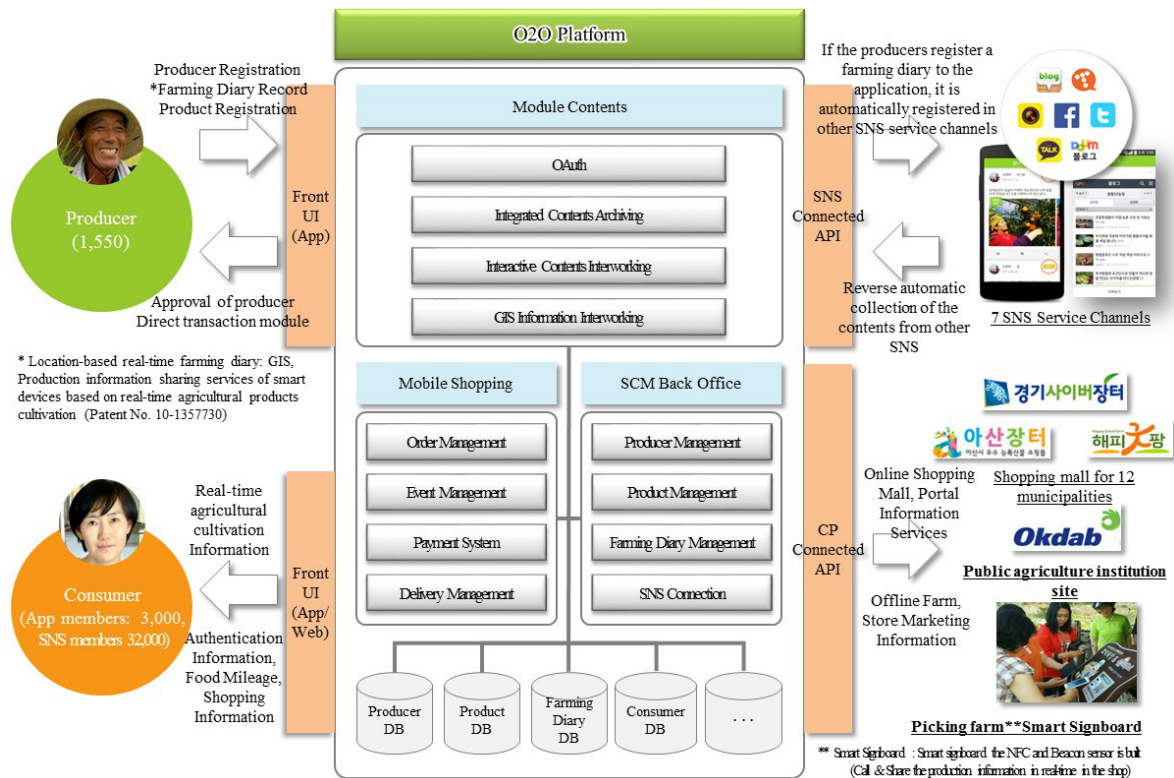


Fig. 2 The Application System Configuration

3 Comparative Analysis and Result

3.1 Methodology

To compare the mobile commerce model using the Oauth Based Real-Time Information Sharing Technique with other mobile commerce cases, variables were defined based on the preceding studies related to the mobile commerce, agricultural e-commerce, IS Success model, and TAM. Because the analysis targeted the mobile application for selling of the agricultural products, successful factors are related to the mobile commerce and agricultural e-commerce. The study on mobile commerce introduced variables such as 'Ubiquity', which is to provide information regardless of time or place, 'Suitability', which means compatibility of user's needs and the lifestyles, and 'Cost', which is the cost factor that can be caused by the new service use. From the study on agricultural e-commerce, we adopted variables such as 'Price', which includes the price fluctuation of products, 'Trust' of customers in sellers, and the 'Tourism Program' which means a connection of product quality to the agriculture tourism. In addition, because the analysis target has the character of an information system, the concept in the IS success model (Delone & Mclean, 2003) was included. This study

adopted variables that are related to the information quality from diverse factors, such as, 'Relevance', 'Accuracy', 'Completeness', 'Update', 'Authority', 'Usefulness' and 'Sufficiency.' And as the analysis target application is a new type technology, the variables of 'Perceived Usefulness' and 'Perceived Ease of Use' of Technology Acceptance Model (TAM) were adopted. The factors related to the acceptance and expansion of an application were considered. Table 1 shows the explanation and the references of the variables for comparative analysis by a theoretical foundation. The use of the analysis parameters based on the theory makes the validated results and also can derive an academic implications from the analysis results.

As the analysis method, we compared and analyzed the cases of mobile commerce using the new model of Oauth Based Real-Time Information Sharing Technique, 3 representative business models of an open market, group purchase based on a social commerce, and the agricultural shopping mall using the variables defined in Table 1. The subject of analysis were selected as Gmarket for an open market, Coopang for a group purchase social commerce, and Hellonature for the agricultural shopping mall based on the market share.

Table 1 Variables for comparative analysis

Principles	Features	Explanations	References
Mobile Commerce	Ubiquity	To be provided with the product information anytime or anywhere	Schneiderman(1992)
	Suitability	To believe that the user corresponds with the need and lifestyle	Thaemin Lee (2004)
	Cost	To pay the additional cost using the system	Vijayarathy(2004)
Agricultural E-commerce	Prices	Fluctuations in prices	Taekseon Lee & Youngchan Choe. (2004)
	Trust	Customer satisfaction and e-loyalty	YoungOk Seo & JinSuk Kim. (2009)
	Product quality	Quality and availability of an agricultural product	Yongcheol Hwang. (2013)
	Tourism program	Agriculture tourism with farmers	Youngju Mun & Jongho Lee (2010)
IS Success Model	Relevance	To provide relevant information	Liu & Arnett (2000)
	Accuracy	To provide accurate information	Liu & Arnett (2000)
	Completeness	To provide complete information	Liu & Arnett (2000)
	Update	To provide updated information	Liu & Arnett (2000)
	Authority	To ensure user confidence in information	Hasan & Abuelrub (2011)
	Usefulness	To provide useful information	Liu & Arnett (2000)
	Sufficiency	To provide sufficient information	Hasan & Abuelrub (2011)
TAM model	Perceived Usefulness	Users believe that a system would enhance his or her job performance	Lee and Lee(2003), Kumar et al.(2007)
	Perceived Ease of Use	Users believe that a system would be free from effort	Lee and Lee(2003), Kumar et al.(2007)

3.2 Analysis Results

Comparative analysis evaluated the differences between the compared targets in respect to the variables of the Table 1. The result excluded variables that were difficult in ana-

lytic judgment. Variables such as accuracy, usefulness and sufficiency were difficult to divide the real-time information of the farming diary into good or bad types. Moreover, variables with no difference are excluded, and only the rest of the variables are reported.

Table 2 The results of comparative analysis

Principles	Open Market	Social Commerce	Specialty Store	New Model
Suitability	Normal	Normal	Normal	Good
Prices	Good	Normal	Normal	Good
Trust	Partially Good	Partially Good	Partially Good	Partially Good
Product Quality	Partially Good	Partially Good	Partially Good	Partially Good
Tourism Program	Bad	Bad	Bad	Good
Completeness	Good	Good	Good	Bad
Update	Normal	Bad	Bad	Good
Authority	Good	Good	Good	Normal
Perceived Ease of Use	Normal	Normal	Normal	Good

In the 'Suitability' variable of the mobile commerce, because a new model expanded its interworking technology with the other mobile applications, which were provided only to the consumers of the existing mobile commerce, it was much superior than any other mobile commerce. One strength is that the producers can provide information to another mobile commerce through the new model (Thaemin Lee, 2004). Concerning the 'Prices' variable of the agricultural e-commerce, sellers and producers can directly change the selling prices at the wholesale 'Open Market' or the 'New Model', however, in the 'Social Commerce' and 'Special Store', a MD(Merchandiser) intervenes with the determination of prices, which makes the change in price more difficult (Youngmun Woo, 2011). In the variables of 'Trust' and 'Product Quality', the existing mobile commerce has the strength of providing objective information, but difficult to confirm the accuracy of the information. In the new model, because producers can also directly upload information, trust between producers and consumers can be improved, however, the objective sales information is not provided (Youngok Seo & Jinsuk Kim, 2009). Accordingly, as those models have both pros and cons, they were defined as 'Partially Good.' The connection with agriculture tourism is 'Good' due to the characteristics of the new model that are not in the existing mobile commerce. From the viewpoint of the information system, the 'Completeness' variable of IS Success Model is inferior to the general product information provided by the existing mobile commerce than the update information sharing method of the new model. On the other hand, the 'Update' variable is much superior because the new model can update information in real-time. Since the existing mobile commerce in the 'Authority' variable puts emphasis on the authentication of information of products, which is 'Good', but producers also provide authentication information in the new model so it is only 'Normal' because no emphasis is given to the authentication. In conclusion, the existing model and the new model are considered to be differentiated in IS success Model, but it is difficult to consider that the new model has improved (Liu & Arnett, 2000). The 'Perceived Easy of Use' in TAM Model may seem similar as all other mobile commerce from the consumer's perspective, however, the 'ease of use' increased on the seller's side for

its ability to upload sales information regardless of place and time, hence it got 'Good' (Kunchang Lee & Sangjae Lee, 2003).

In conclusion, the mobile commerce of the new model is improved in the variables of 'Suitability', 'Prices', 'Tourism Program', 'Update' and 'Perceived Ease of Use.' On the other hand, 'Completeness' and 'Authority' are insufficient parts compared to the existing mobile commerce. Through this, Oauth Based Real-Time Information Sharing Technique can provide a differentiated value from the existing mobile commerce.

4 Business Model Example of Real Time Information Sharing

This chapter introduces some business models to show what a mobile commerce using the real-time information sharing technique can provide. Three examples including the school feeding service, local food market, and the agriculture tourism business are introduced.

4.1 School Food Service

In order to maintain safety and trust which are considered important in the food feeding service, each local government establishes school feeding centers and regularly performs safety tests and puts its effort in raising use of an eco-friendly agricultural products. In the Supply Chain Management's (SCM), high safety is maintained because the HACCP certification is now compulsory and the production traceability is also possible. However, as students and parents have difficulty in checking the information about the production process, those feeding service depends on an organization such as the feeding center. Oauth Based Real-Time Agricultural Information Sharing Application can provide producers' farming diaries to students and parents. In particular, since the real-time production traceability information uploaded by producers can be checked and communication via social network such as Kakao Talk, it is possible to reinforce the trust in agricultural products through trust in producers.



Fig. 3 School Food service Business Model

4.2 ICT Based Local Food Farmer Markets

The existing local food store provides information on producers but does not provide the information on the production process of products. Accordingly, in order for producers to provide production traceability information on items to customers using local food stores, information provision service connecting the mobile application should be implemented. For those customers who do not use smartphones, a touch panel screen installed at a store can provide

real-time production information by operating the digital signage system. Use of beacon technology can provide not only the real-time production information but also the coupon information to consumers' cellphones through Bluetooth based wireless local area communication system when the consumers enter stores. If customers of local food stores can readily be provided with the production traceability information directly written by producers using various technologies, consumers' trust in products can be easily reinforced.

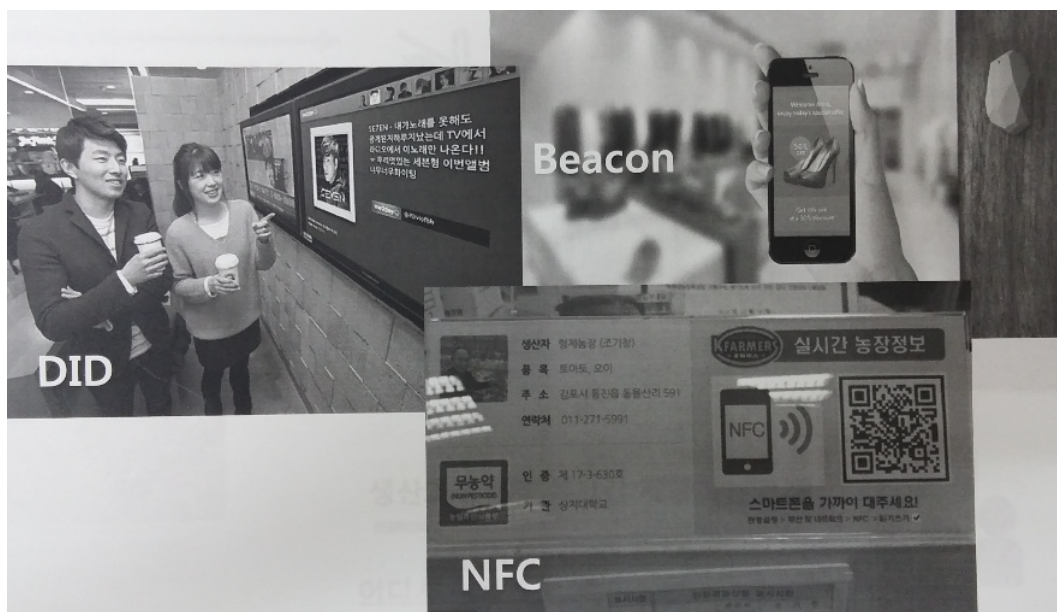


Fig. 4 System construction in local food farmers market

4.3 Real-time Rural Tourism Information Sharing Mode

The producers using the Oauth Based Mobile Application can upload surrounding rural tourism information as well as the production traceability information in real time on

social network service. Because the page with this information can connect other existing related-experience program websites, visitors can investigate rural tourism programs and reserve individual experience products in real-time. Furthermore, since visitors can write reviews on

the producer-registered rural tourism, it can naturally provide evaluation information to other consumers. Moreover, if a consumer of an agricultural product may visit the specific farm, it will reinforce the consumer's trust on the products. And consumers' activities on social network will also lead to advertising of rural areas.

5 Conclusion

This study showed that a mobile commerce model using the Oauth Based Real-Time Information Sharing Technique can provide differentiated values from the existing mobile commerce. The existing mobile commerce services enrich product information, provide accredited information and raise trust, easily link product information pages to other mobile applications, and finally enable product advertising through social network. However, this evolution has a limit that completely focuses on consumers. On the other hand, since Oauth based real-time information sharing mobile commerce connects the production traceability information recorded by producers in individual social network service such as Facebook, producers can easily update additional information for product sale. Moreover, because other can upload a great deal of information such as rural tourism information in real time, it has an important significance in that online social relationships with the consumers can be formed and also that the possibility of communication with the consumers is open. In other words, as this relationship-focused agricultural sale channel enables a direct agricultural transaction based on trust between producers and consumers, it can include the characters of an alternative agricultural market such as the offline farmers market.

However, the Oauth based real-time information sharing mobile commerce model is still at the initial stage because it has just started from a small venture company. Compared to the mobile commerce services implemented by the existing open market, group purchase based social commerce, specialty store, it is relatively insufficient in the 'Completeness' and 'Authority' of information. But in the viewpoint of producers, it has potential growth because it has many strong points. Therefore, it needs to include the strong points of the existing mobile commerce services for further development of this new commerce model in the future. In addition, education for using a smartphone and utilizing a social network service for the relatively aged producers is important.

Further studies need quantitative performance evaluation such as analysis of the number of users, sales data

and questionnaire on application users in order to verify the effects of Oauth based real-time information sharing mobile commerce. Furthermore, a study on the factors influencing success is necessary. Besides, it is worth considering a technical transfer of the existing mobile commerce services in order for Oauth based real-time information sharing mobile commerce to expand in the long run. If a large scale expansion is possible, it can be expected that a new age of online commerce market that is based on the connection of agricultural producers and consumers in social network will open.

Acknowledgments

This research was supported by the MSIP(Ministry of Science, ICT and Future Planning), Korea, under the the C-ITRC(Convergence Information Technology Research Center) (IITP-2015-H8601-15-1007) supervised by the IITP (Institute for Information & communications Technology Promotion)

Reference

- Anna Vapen, Niklas Carlsson, Anirban Mahanti, & Nahid Shahmehri.(2015). Information Sharing and User Privacy in the Third-party Identity Management Landscape, CODASPY'15, March 2-4, San Antonio, Texas, USA.
- Chechen Liao, Prashant Palvia, & Hongnan Lin. (2006). The roles of habit and web site quality in e-commerce, *International Journal of Information Management*, 26(6), 469-483.
- Hasan, L., &Abuelrub, E. (2011). Assessing the quality of web sites. *Applied Computing and Informatics*, 9(1), 11-29.
- Kun Chang Lee, & Sangjae Lee.(2003). A cognitive map simulation approach to adjusting the design factors of the electronic commerce web sites, *Expert Systems with Applications*, 24(1), 1-11.
- Miyoung Baek, & Sanglin Han. (2015). Analysis of Usage Motivation and Repeat-Using Intention in Mobile Social Commerce, *Korean Journal of Business Administration*, 28 (1).
- Schneiderman, B. (1992). *Designing the User Interface: Strategies for Effective Human-Computer Interaction* (2nd ed.), Reading, MA: Addison-Wesley.
- Sunghee Park, Heabin Joe, Yehyun Shin, Yongbeen Cho,& Youngchan Choe. (2014). Analysis of the Agricultural Electronic Commerce: A Study on Documentary Research and Present Condition Comparison, *KOREAN JOURNAL OF FOOD MARKETING ECONOMICS*, 31(1), 25-49.
- Statista. (2015). Number of social network users worldwide from 2010 to 2018. Available from <http://www.statista.com/statistics/278414/number-of-worldwide-social-network-users/>.
- Taekseon Lee, & Youngchan Choe. (2004). Measurement of Customers Satisfaction in Agricultural E-Commerce, *Journal of Agricultural Extension & Community Development*, 11(1), 125-137.

- Thaemin Lee. (2004). The effects of components of Interactivity on customer relationship building and purchase intentions in Mobile Environments, *Journal of Korean Marketing Association*, 19(1), 61-96.
- The Ministry of Science and ICT and Future Planning. (2014). Mobile Internet use survey report, 6.
- Vijayarathy, L. R. (2004). Predicting consumer intentions to use on-line shopping: The case for an augmented technology acceptance model. *Information & Management*, 41(6), 747-762.
- Vinod Kumar, Bhasker Mukerji, Irfan Butt, & Ajax Persaud, Factors for Successful e-Government Adoption: a Conceptual Framework, *The Electronic Journal of e-Government*, 5(1), 63-76.
- William H. DeLone & Ephraim R. Mclean. (2003). The DeLone and Mclean Model of Information Systems Success: A Ten-year Update, *Journal of management information Systems*, 19(4).
- Yongcheol Hwang. (2013). A Study on Influencing Factors of Consumer Satisfaction, and Behavior after Purchase in Online Shopping for Agricultural Products, *Journal of Marketing Studies*, 58(21), 59-71.
- Young Ung Lee. (2009). Construction of Farming-diary Management System Using Ubiquitous Technologies
- Youngju Mun, & Jongho Lee. (2010). A Study on the Effects of Farm Experience Program Characteristics of Agricultural Internet Shopping Mall on Trust and Purchase Intention, *Journal of KECRA*, 11(4), 55-71.
- Young Mun Woo. (2011). How do Merchandisers in Large Retailers Purchase Agriculture Products, *Journal of Channel and Retailing*, 16(5), 123-140.
- Youngok Seo, & Jinsuk Kim. (2009). A Survey on the Consumer's Satisfaction Factors in Internet Shopping of Agricultural Products, *Journal of Agriculture & Life Science*, 43(2), 65-78.