ICIC Express Letters
Part B: Applications
Volume **8**, Number **12**, December **2017**
 ISSN 2185-2766
pp. **1627–1633**

INCREASING CUSTOMER CONVENIENCE BY PRODUCT INFORMATION INTERMEDIATION PLATFORM FOR CONVENIENCE STORES

Kyunyeol Park[1], Seungeun Kim[2], Haksu Kim[1] and Dongsoo Kim[1,*]

[1]Department of Industrial and Information Systems Engineering
[2]Department of IT Distribution and Logistics
Soongsil University
369 Sangdo-Ro, Dongjak-Gu, Seoul 06978, Korea
{ indroday; jnd3368; sungkim }@soongsil.ac.kr; *Corresponding author: dskim@ssu.ac.kr

Received June 2017; accepted September 2017

Abstract. *This paper proposes an innovative business model for convenience stores (CVSs) by product information intermediation platform based on mobile technologies. Specific components of the business model including business processes are presented in detail. Existing mobile applications for CVSs can only provide their own information and services, which results in significant dissatisfaction of customers who want unified and integrated services. However, using the new intermediation mobile application, customers can search and find the goods they want to buy and acquire integrated information from nearby stores. Furthermore, the proposed system can provide CRM information to CVSs by analyzing collected customer data. The proposed intermediation mobile application improves the purchase experience of customers through the real-time product information search services. Also, CVSs can obtain valuable customer insights using the integrated platform.*
Keywords: Business model, O2O, CRM, Mobile application, Convenience store

1. **Introduction.** Currently, convenience stores (CVSs) in Korea are continually expanding their market size, led by major brands (CU, GS25, and 7-Eleven). Sales are expected to exceed 20 trillion Korean Won in 2017, 17.6% growth from the sales in 2015 [6]. Aside from selling various products, services provided to customers at CVSs have become diverse. Recently, CVSs have been providing customer services based on online and mobile technologies. Despite all the efforts of companies to provide such kind of customer services, many customers still feel uninformed about the product line and the inventory level of the items of their interest.

Many of the customers visit CVSs to purchase products without much information about the stores they are visiting. In many cases, the lack of information will result in customers leaving the stores empty-handed or buying unwanted products. In order to reduce this inefficiency, we design a new application that notifies the users about the location of nearest stores that hold particular products and provides their real-time inventory level.

The significance of the application can be described from the two perspectives of CVSs and customers. First of all, by using such application, companies can develop the new sales channels through which they can expand their sales. Thanks to the application, various marketing such as target marketing, one-to-one marketing, and relationship marketing can be implemented to meet the needs of potential customers and generate more consumption. The application enables the customer data to be collected on the application server. Also, it can provide gathered data to each CVS or present customer relationship management (CRM) reports to companies after analyzing the data by using appropriate analysis algorithms. In addition, using the data, more accurate ordering and inventory

management can be achieved, which can minimize the loss of sales opportunities due to product shortage, and reduce the inventory costs of excess inventory. In terms of the benefit of customers, the application can guide them to purchase the products of their actual needs, without impulse buying in the nearest CVS; thus they can make a reasonable and efficient consumption. Therefore, the proposed application can preemptively prevent the abovementioned problems and increase customer satisfaction. In addition, customers can purchase desired products at a lower cost by using various services and coupons provided by companies through the mobile application.

This paper presents the business model to propose solutions that can identify, analyze and satisfy the needs of customers and businesses. As the business model is an intermediary model that meets each other's needs between customers and companies, it can be defined as a concept that generates profit by earning commission and advertisement revenues in the way that it provides user data to companies. In order to achieve this, establishing an affiliation strategy with each company and acquiring user information is a key point for the success of the business model.

Previous researches on CVS customers mostly focused on the effects on satisfaction and purchasing intentions; thus there is a lack of research or business model to improve the customer's real-life purchase experience. This study has a practical significance of proposing a creative business model by integrating product information from various CVS brands in real time and acquiring customer insights through customer information analysis.

The rest of the paper is organized as follows. Section 2 reviews previous researches and Section 3 presents the business model for the application. Section 4 describes the application's use case, its additional functions, and the electronic customer relationship management (e-CRM) process. Finally, we conclude this paper and describe future work in Section 5.

2. **Related Work.** This section reviews related work and describes the theoretical backgrounds. The business model represents the value creation plans, financial assets, and information flows among shareholders, including customers, suppliers, and partners, to generate revenue for the enterprise [8]. This varies depending on the service domain the companies utilize [9]. Business model canvas (BMC) is one of the methods used to visually represent the concept of a business model. The nine components of BMC are 'Value Proposition', 'Customer Segment', 'Key Activities', 'Channel', 'Customer Relationship', 'Key Resource', 'Key Partnership', 'Cost Structure' and 'Revenue Stream' [5]. The business model makes it easy for companies and stakeholders to understand the business plan and, it is effective in developing new businesses [11].

Previous business models for CVS products focus on just promotion events and coupon information. In this study, the business model is a new solution that provides real-time integrated product information of nearby CVSs and direct convenience to customer purchasing. In addition, this intermediation business model has significance in terms of clearly expressing the value provided to the CVSs. Because this business model can create a higher value than the existing solution, it is an innovative business model in view of the value proposition.

The e-CRM means performing CRM activities on the basis of online environment e-CRM overcomes the limitation of one-to-one response of traditional CRM and enables real-time communication. In addition, it is possible to collect and process large amounts of customer data, so that it can recommend appropriate products and perform one-to-one marketing according to the customer's purchase intention [10]. The key to e-CRM is how well they utilize customer data for real-time marketing and differentiation strategies. The business model presented in this paper includes key activities to provide a CRM report to CVS companies through customer data analysis. For example, this report can expand the

customer insights by analyzing how many customers in a particular region have access to it, what their favorite products are, and how many people are interested in a particular product.

The online to offline (O2O) is an activity that induces purchasing by linking online and offline channels in transactions of products and services creating new values by combining the advantages of online and offline [2,3]. Several service types of O2O include 'business expansion' from online to offline or from offline to online, 'platform basis' providing services, and 'collecting information' from various companies to customers [4]. The new business proposed in this study can be called 'business expansion' in that the customers can obtain the integrated information such as products, coupons, and events through online applications and the web and can utilize the information for offline shopping at CVSs.

3. **Business Model and Process.** This section describes the core components of the proposed business model and explains the process of intermediating customers and CVS inventory information using business process model and notation (BPMN) standard.

The *customer segments* of the proposed business model can be divided into two categories. The first is the category of customers who want to use the CVSs effectively as the actual users of the application. The second is the category composed of the CVS brand headquarters and affiliated stores. *Key activities* include providing real-time product information search services to CVS customers and finding insights by analyzing customer data collected from the application. It is a core *value proposition* to increase the customer experience and to help provide companies potential customer needs. In order to implement this, *key resources*, including this new application, database access to the CVSs, and CRM data analysis are required. From a *cost structure* perspective, costs for application development, maintenance, server and labor are required. And in terms of *revenue streams*, main revenue comes from providing the CRM information to CVSs. In addition, the application can earn revenue by in-app advertising.

Figure 1 shows the proposed application process model based on BPMN that can easily create complex business processes [7]. The three pools in the model represent users, an application server and a CVS inventory server. Assuming subscription and global positioning system (GPS) consent, after the user's GPS information is transmitted to the application server, the user determines criteria for searching stores and products. Meanwhile, the

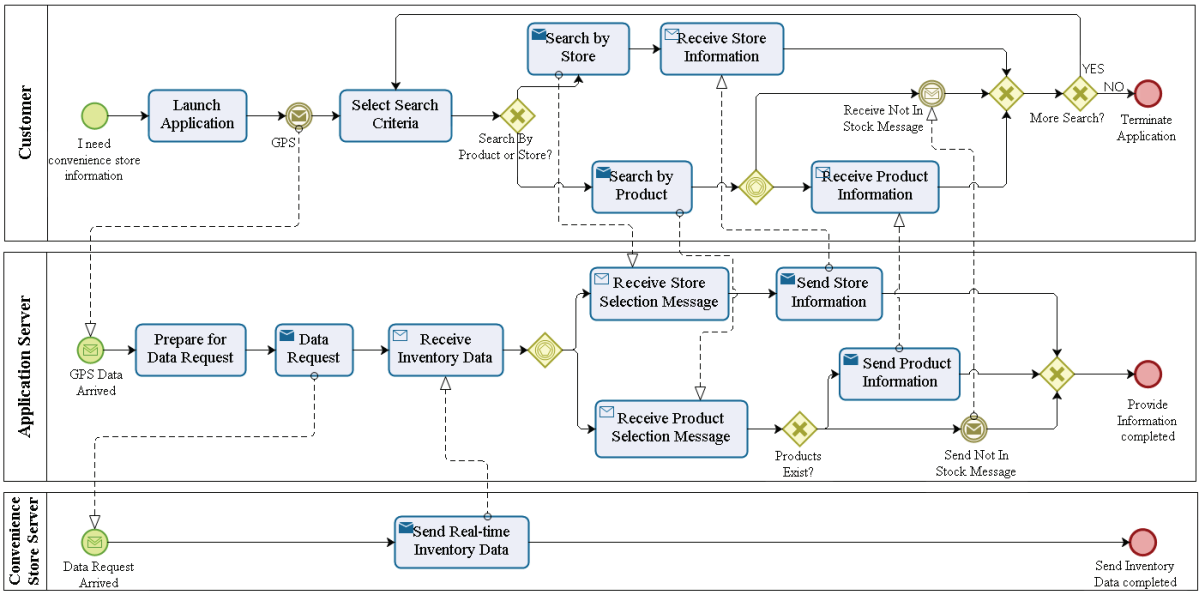

FIGURE 1. Business process model for CVS product search service

application server requests the real-time inventory data to the CVS server in order to provide the product information according to the user's location information. When the CVS server transmits inventory information to the application server, it provides appropriate information according to the customer's search criteria. If the particular product that the customer searches is not available, the application server immediately notifies the customer that is out of stock. The search process can be implemented repeatedly until the customer has enough information.

4. **Use Case and e-CRM.** In this section, a use case scenario for the application and the data-driven e-CRM are presented. At first, it explains how to provide a user-friendly user interface (UI). Also, this section describes how customer insights can be provided to the CVSs using the data, and how to implement e-CRM for customers.

4.1. **Application user case.** Before running the application, a user wants to purchase a product from the nearest CVS. However, since there are various items handled by CVSs in recent years and it is uncertain whether the corresponding product is in stock. Then, the application is executed to obtain such information of the product. When the application is launched for the first time, a membership registration screen is displayed, and the user inputs a few contents, and then the user's information is transmitted to the main server. The application then collects the GPS information on the user and prepares the inventory data of CVSs based on the customer's geographic location (labeled (a) in Figure 2). In case of retrieving product data from CVS server, product information of nearby stores is transferred considering massive amount of data, which enables easy real-time data update. The user then searches for the products he or she wants to purchase or nearby CVSs (labeled (b)). The search function has a variety of optional functions that can be divided into CVSs, product groups, and discount events. The search history and log data for the user remaining on the server become the base data for one-to-one marketing and target marketing. If the user obtains the desired information, he or she can close the application (labeled (c)). In addition, if the users want to check other product information of a store, click the 'Check Stock' button (labeled (d)).

The application has a variety of additional functions besides the main function of searching for products and CVSs (labeled (e) in Figure 3). The first one is to confirm promotion event goods. It is a function that can be confirmed through the upper left menu of the application. Through this function, users can check event items of each CVS before visiting the CVSs. According to the selection of the options, the users can check the event items by CVSs (labeled (f)). The second one is the information function for overall CVSs.

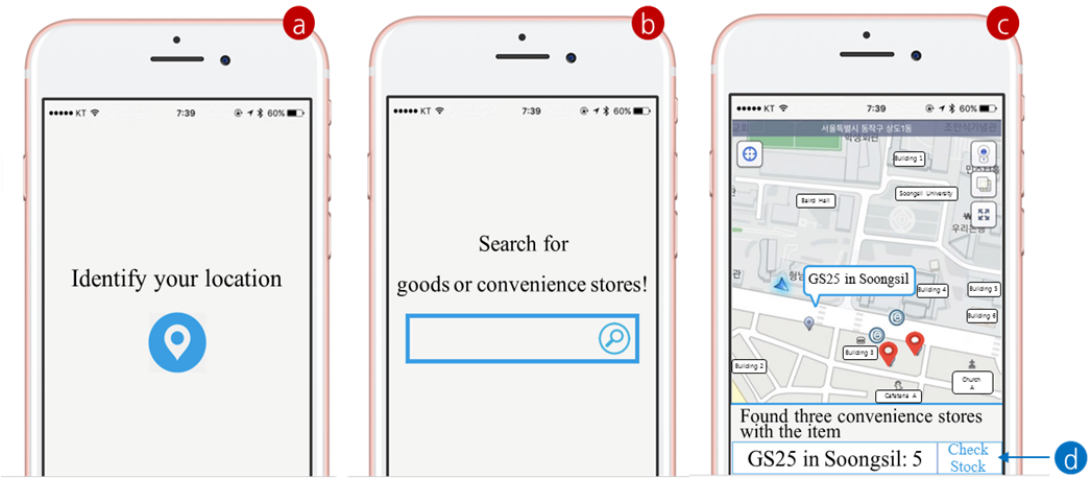

FIGURE 2. Application prototype showing the search function

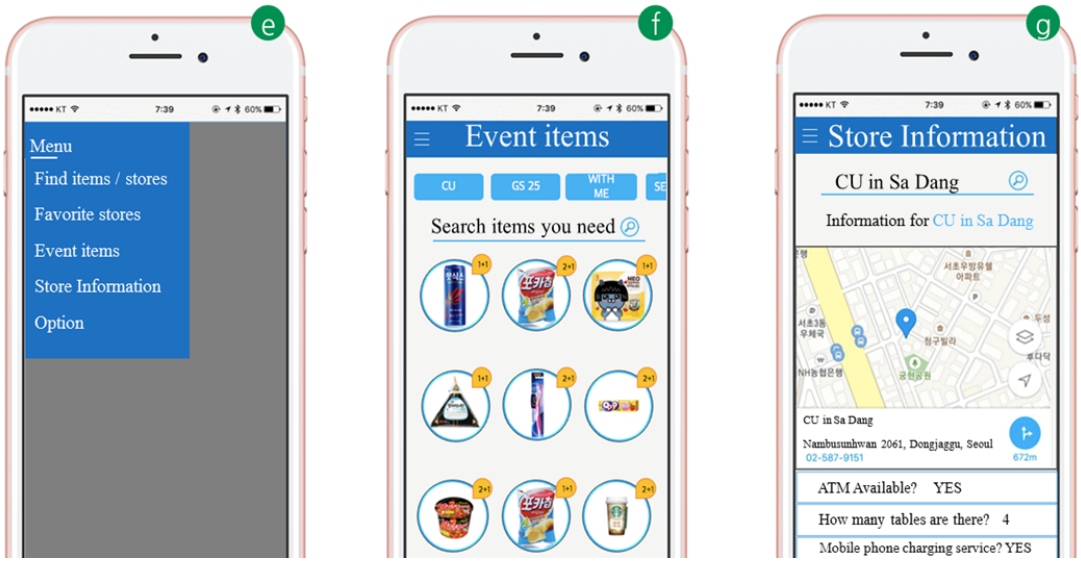

FIGURE 3. Application prototype showing additional functions

When this function is selected, the application notifies the users whether the particular store has an automatic teller machine (ATM) device or seats outside thereby increasing the customer satisfaction.

The third one is the shopping cart function. CVS customers typically scan the entire product line rather than looking for a specific brand. Therefore, in order to make more reasonable and planned consumption, the application provides the shopping cart function so that the customers can put the desired products in the shopping cart. Particularly, helpful insights can be suggested to the CVS companies through the product search function and the shopping cart function. Thus, we can find the relationship between search and actual consumption behavior. It is important to analyze the data to see if the products have actually been consumed after searching or putting it in the shopping cart.

The fourth additional function is a coupon feature. Using the customer data accumulated on the server, various coupons according to the customer's preferences can be provided to the customers through pushing. CVSs can also use recent augmented marketing to notify customers of available coupons at nearby CVSs, depending on the customer's movement path (labeled (g)).

4.2. **e-CRM using business intelligence.** The CRM report is a core source of revenue stream of the proposed business model and an alliance strategy to obtain product information of CVSs in real-time. Various data about users application execution logs, are recorded on the application server. For example, it is possible to obtain gender, age, residence, and preferred store brand information during the sign-up process. The location information can be acquired by collecting GPS information with the user's consent. Also, CVSs using search data can know which products users want to buy. In other words, it can analyze the potential needs of customers looking for CVSs through log data, which help customized marketing and one-to-one marketing for CVS companies. These customer insights can be a basis for establishing a competitive strategy and a differentiation strategy.

Figure 4 shows the CRM report generation process of this study by reconstructing previous study [1]. This report is the core of the customer's potential needs and can be used as a corporate insight. First, it preprocesses according to the user's access type (mobile/browser), region, search word, etc., in combination with the collected execution logs of the application and user's information. The preprocessed data are converted to JavaScript Object Notation (JSON) or MS-Excel file format and analyzed using machine

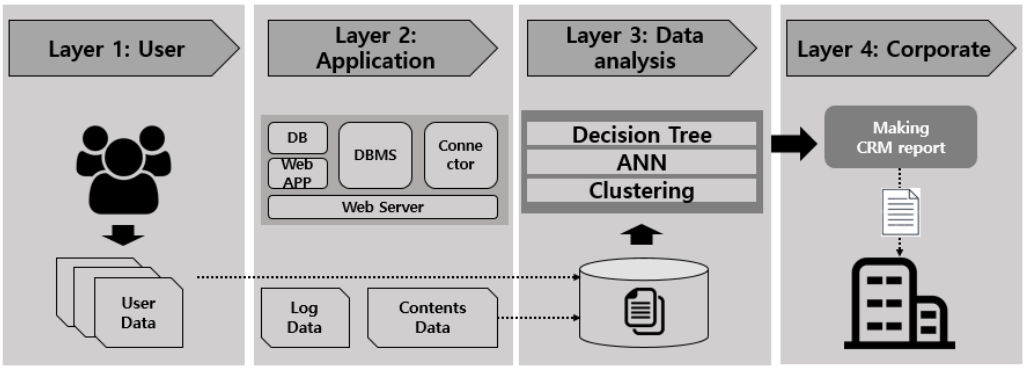

FIGURE 4. CRM report generation process

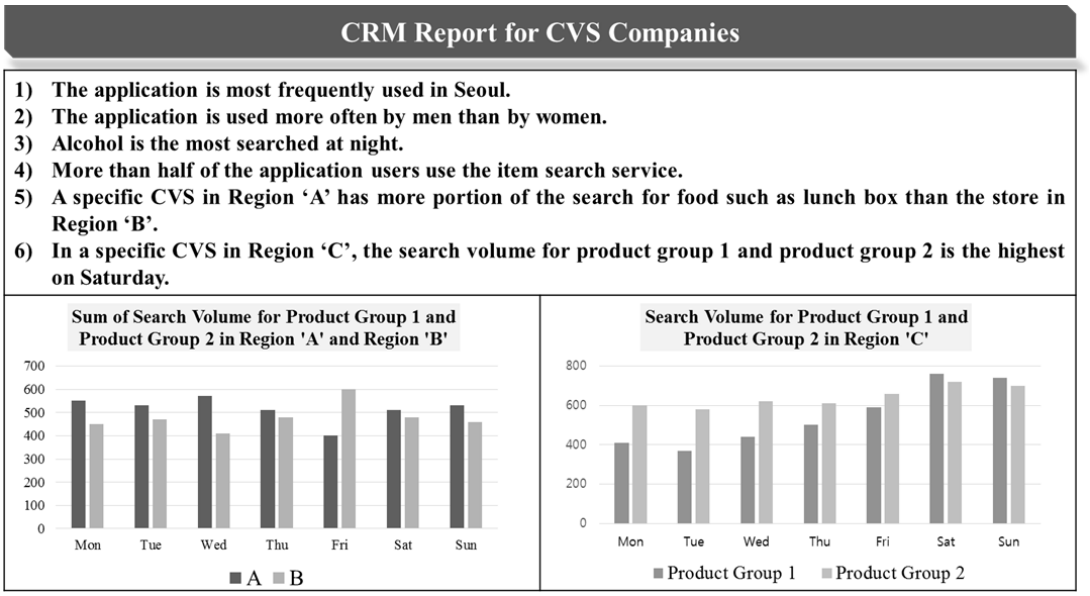

FIGURE 5. Example of the CRM report

learning algorithms such as artificial neural network, decision tree, and clustering techniques. The analysis results can be visualized according to the purpose of analysis. After analyzing the results with domain experts, the CRM report can be created and provided to the CVS companies.

Figure 5 shows an example of the CRM report indicating which region and gender groups have used the application most, which items are frequently searched by stores, and which product groups have been searched. When the search volume of the stores located in the vicinity of 'A' and 'B' is compared with each other, the frequency of search for product group 1 (e.g., beer) and product group 2 (e.g., cup noodle) is higher in 'A' than in 'B', but higher in 'B' only on Friday. After analyzing the differences, we may find that the geographical factor that the area 'A' is closer to the business that is complex and the area 'B' is closer to the university that influences the search volume of product group 1 and 2. If the store in 'B' uses this information, the company can increase its profit by promoting coupons on product group 1 and 2 on Friday. In addition, it can be expected that the sales volume will increase on Friday, which will help the inventory management by increasing the order quantity than usual.

In a specific CVS in region 'C', the search volume for product group 2 is larger than the search volume for product group 1 on weekdays. On the other hand, the search volume for product group 1 is larger than the search volume of group 2 on weekends. This result

can suggest that the store in region 'C' needs to reconsider inventory planning for product group 1 and product group 2, depending on whether it is weekdays or weekends.

5. **Conclusions.** We proposed a new business model for CVSs integrating real-time product information of a variety of CVSs. This service enables customers to visit the nearest CVS without worrying that the stores may not have necessary items. According to the business model of the proposed mobile application service, CRM reports can be presented to CVS companies in order to provide customer insights. By using the application, customers can avoid the loss of time and money by optimizing the path to purchase. Also, from the standpoint of the companies, it enables the companies to achieve the Omni channel environment by expanding the sales channels.

In the future, a comprehensive research on the relationship between search data and actual consumption is needed. Then, the companies can execute a more diverse and aggressive CRM strategy using the application. This not only contributes to the promotion of customer consumption, but also enables pre-recognition of best-selling products and unwanted products through search history and shopping cart data from the CVS perspective. Furthermore, efficient inventory management for CVSs reduces inventory costs.

Acknowledgment. This work is supported by Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Science, ICT & Future Planning (NRF-2017R1D1A1B05029080). The authors also gratefully acknowledge the helpful comments and suggestions of the reviewers, which have improved the presentation.

REFERENCES

[1] A. Berson and S. J. Smith, *Building Data Mining Applications for CRM*, McCraw-Hill, 2002.
[2] D. Kim, K. Kim, D. Choe and J. Y. Jung, Service issues and policy directions for promoting the O2O industry in Korea, *Journal of Society for e-Business Studies*, vol.21, no.4, pp.137-150, 2016.
[3] D. G. Kim, O2O trends and implications, *ICT & Media Policy*, vol.26, no.22, pp.1-20, 2014.
[4] J. Kim, H. Kwon and D. Kim, Industry trends and challenges in on-demand services in South Korea, *ICIC Express Letters, Part B: Applications*, vol.7, no.9, pp.1933-1938, 2016.
[5] J. M. Ryu, Y. M. Seo and H. J. Cho, A study on business model of fintech focus on the business model canvas, *The Society of Digital Policy & Management*, vol.14, no.3, pp.171-179, 2016.
[6] J. Yang and B. Yun, Convenience store distribution, *Meritz Research Industry Brief*, pp.1-22, 2017.
[7] M. Kim, T. Lim and D. Kim, Development of a strategy and guideline for adopting business process management standards, *Journal of Society for e-Business Studies*, vol.12, no.2, pp.249-257, 2007.
[8] M. Morris, M. Schindehutte and J. Allen, The entrepreneur's business model: Toward a unified perspective, *Journal of Business Research*, vol.58, no.6, pp.726-735, 2005.
[9] N. Lee and O. Kwon, A methodology for u-service business model diagram and analysis, *Journal of Society for e-Business Studies*, vol.14, no.1, pp.13-34, 2009.
[10] S. S. Kim, Strategy for establishing e-commerce system for small-business, *Journal of Information Processing Systems*, vol.6, no.1, pp.83-87, 1999.
[11] Y. Oh and D. Kim, Development of an innovative e-Business model for online shoes shopping using smartphone-based 3D scanning technology, *ICIC Express Letters*, vol.10, no.3, pp.643-648, 2016.