# Mapping Features of Smartphone on Consumer Behavior Model toward O2O2O

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*Abstract*—The smartphone has become a popular choice among mobile phones all over the world. Smartphones can provide more advanced services than feature phones can. They have also changed the way users perform information search and distribution. Consumers can access information and enterprises can distribute information via the Internet with smartphones anytime and anywhere. Thus, the spread of smartphones has caused revolutionary changes in consumer behavior and in enterprises' approach to consumers. Therefore, we have analyzed such changes based on actual services using smartphones and have systematized smartphone features with traditional consumer behavior theories. The mapping proposes a vision of what services using smartphones should be from the viewpoint of consumers.

*Keywords*-O2O; GPS; NFC; AR

## I. INTRODUCTION

A smartphone is a mobile phone that offers an advanced operating system and compares favorably with a laptop computer. Modern smartphones have various functions; e.g., media player, digital camera, global positioning system (GPS) navigation unit, near field communication (NFC), and touch screen. The most important feature to be noted is a smartphone's ability to can display standard web pages as well as mobile-optimized sites. People can easily obtain information they are looking for via the Internet using a smartphone anywhere they go [9]. Therefore, users' behavior, especially in transactions, has changed drastically with the use of these devices [7].

A consumer can compare prices of a product in a real store using a smartphone. A consumer can also search the route map from the current location to the store which sells the product at the lowest price. On the other side of the commercial transaction, an enterprise can send advertising to a consumer according to his/her location. For instance, when a store holds a sale event, it can broadcast an advertisement announcing the event to the smartphones of consumers in proximity of the store. Thus, consumer behavior is changing through functions of smartphones.

Due to these changes, enterprises' approaches to consumers are also changing. Enterprises are trying to lead consumers to real stores to make purchases in their stores through various online services over the Internet using smartphones. One such service is called Online to Offline

(O2O). O2O2O also denotes that consumers go back and forth between online and offline status.

It is not a premise that O2O is implemented by the use of smartphones. However, most O2O services are implemented through functions of a smartphone. The spread of smartphone use has triggered the expansion of O2O businesses. It has also broken down the borders between the real world and the Internet. The approach of consumers using smartphones is becoming more important for enterprises. Enterprises are being pressured to respond to changes in consumer behavior. That is, they must provide attractive and novel services using smartphones after obtaining understanding of modern consumer behavior.

Many studies and models of online consumer behavior have been performed [3][6][8]; however, there are no studies of consumer behavior of O2O-specialized smartphone features. Therefore, we attempt to examine the features/services of smartphones within the consumer behavior model. First, we have surveyed actual services using smartphones and analyzed changes in consumer behavior and the response from enterprises. Based on this survey, we have related the features to elements of the consumer behavior model and made a map of the relationships found. This map can help enterprises to capture with certainty a consumer's motivations within the O2O generation.

## II. THE FEATURES OF SMARTPHONES

We herein enumerate and explain the major features of smartphones. Modern smartphones have the following devices in addition to telephone, e-mail, and Internet browsing.

NFC is a form of contactless communication between devices. Contactless communication enables a user to wave his or her smartphone over a NFC-compatible device to send information without physical contact between the devices or going through multiple steps to set up a connection. NFC is a set of short-range wireless technologies, typically requiring a distance of 1.6 inches or less. NFC-enabled devices can be used in contactless payment systems, similar to those currently used in credit cards and electronic money smartcards, and enable mobile payment to replace or supplement these systems.

Table I
THE MAP AMONG ELEMENTS OF THE CONSUMER BEHAVIOR MODEL, PURCHASING PROCESSES, AND SMARTPHONE FEATURES

| Consumer behavior | Purchasing process | Smartphone services/applications | Smartphone features |
|---|---|---|---|
| Attention | Information contact | Market research/data analytics | All |
| Interest | | Digital commerce | All |
| Desire | | | |
| Memory | | Web browsing | App |
| Action | Funds access | Payments | NFC, App |
| | Store selection | Rewards/CLO (Card linked offers) | NFC, App |
| | | Customer loyalty | All |
| | | Digital coupons | All |
| | Store contact | In-store marketing | NFC, App |
| | Product contact | Bar code scanners | Camera |
| | | Digital coupons | NFC |
| | Transaction | Payments | NFC, App |
| | | Point of sale | NFC, App |
| | | eReceipts | App |
| | Consumption and disposition | — | — |
| | Communication | Social media | App |

GPS is one of the more frequently overlooked enhancements in consumer technology. GPS on smartphones is no longer an emerging trend; it's almost a must-have feature today, and more and more handsets offer it. With the embedded GPS receiver and a mapping service, we can get real-time position tracking, graphic-guided directions, and points of interest.

Most smartphones have a digital camera function that can capture both still photographs and video. Today, the technology on new smartphones has leapt forward enormously with better quality lenses, shooting modes, zoom functions, and even image enhancement built right in. There are many epoch-making applications with the camera; e.g., bar code scanner and Augmented Reality (AR). The bar code scanner application using the smartphone's camera can capture the UPC or EAN bar code on a product in any store. The user then relies on the application to search the Internet for reviews of the product, places to buy, and the best pricing available.

AR is a live, direct or indirect, view of a physical, real-world environment whose elements are augmented by computer-generated sensory input such as sound, video, graphics, or GPS data. For instance, Google Sky Map will appeal to stargazers and astronomers of all skill levels. The user simply points his or her phone at the sky and identifies a legion of constellations, stars, and planets. Upon moving the camera around, the information will change in accordance with the coordinates. AR can be used to display certain products in many other ways.

## III. RELATIONSHIPS BETWEEN SMARTPHONE FEATURES AND CONSUMER BEHAVIOR

The consumer takes control of his or her in-store shopping experience through the use of smartphone applications.

Consumers are using these features to access highly targeted offers, decide when and where to shop, compare product pricing and features, and even make purchases.

Many consumer behavior models can be applied for the Internet, ubiquitous, and mobile society. However, the consumer behavior in the O2O generation can be explained using traditional (offline behavior) theories, because the purpose of O2O is making a consumer purchase within a physical store in the end. O2O does not make a clear distinction between online behavior and offline behavior. Thus, we systematize the major features and services of a smartphone using the AIDMA model [5] and the purchasing model of overt consumer behavior [2].

The 13 O2O key technologies have been listed by Gridley & Company LLC as follows [4]:

1) Market Research/Data Analytics
2) Payments
3) Point of Sale (POS)
4) In-Store Marketing
5) Integrated Systems
6) Bar Code Scanners
7) Digital Coupons
8) Rewards/CLO (Card Linked Offers)
9) Customer Loyalty
10) Traditional Coupons
11) Account Marketing
12) Digital Commerce
13) eReceipts

For the purposes of mapping, we have used only the technologies relevant to smartphone use. Table I shows the map of the relationships of O2O technologies with features of

smartphones and elements of consumer behavior.

The first step of the purchasing process, information contact, demonstrates the importance of shops and products publicizing themselves or making themselves known to the market. Consumers search information via the Internet using smartphones, and retailers provide applications focused on digital commerce and Internet marketing. In the second element, funds access, retailers provide various means of payment; e.g., e-money by NFC and applications for online payment with credit cards. In the third aspect, store selection, stores have to make themselves attractive in order to be selected, using such methods as online-distributed digital coupons, loyalty programs, and services of CLO (Card-Linked Offers).

In the fourth aspect, store contact, retailers can push their recommended information to the smartphones of consumers as a form of in-store marketing. The fifth step, product contact, involves consumers weighing the benefits of buying a product from one store against another store through web browsing or applications using bar code scanners. Consumers also seek lower prices and discount services, like in-store-distributed digital coupons by NFC.

In the sixth step, transaction, retailers focus on providing convenient payment methods. Moreover, retailers should develop the appropriate infrastructure, not only for collecting and processing payments, but also for storing customer payment information (e.g., customer's purchase history, POS data) to ensure pleasant shopping and the assortment of products. In the seventh and eighth steps, customers review products, thus providing valuable information for other shoppers. Customer reviews through avenues like social media are considered the most effective way of mobilizing consumers to "talk up" products online.

## IV. DISCUSSION

As mentioned above, the O2O consumer behavior can be mapped with the features and services of smartphones. We have validated the map by the case study of actual smartphone services. For example, the map explains consumer behavior with a smartphone application AisleBuyer [1]. This application offers convenient in-store shopping with the use of the bar code scanner. With AisleBuyer, retailers enable consumers quickly and easily to access detailed product information and instantly make a purchase without waiting in line, all while standing in the store using a smartphone. By scanning product bar codes or browsing the store's product catalog, shoppers can instantly find the information they need to make the best purchasing decisions, resulting in a higher conversion rate and deeper customer satisfaction. AisleBuyer enables shoppers to skip checkout lines or even self-serve checkouts by paying with their credit card directly on their smartphones. Consumers can also search nearby member stores of AisleBuyer and access information about
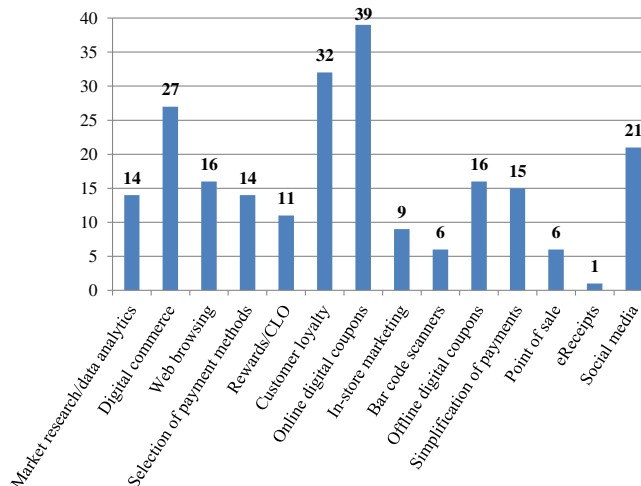


Figure 1. The number of O2O cases using each smartphone application

their products with GPS. This application faithfully traces the process of the map.

Moreover, we have surveyed 73 cases of O2O with smartphones and gathered the statistics of the features on the map. Figure 1 shows the number of the cases using the smartphone services/applications on the map. In the graph, the online digital coupon is the most frequent service used by enterprises to activate the O2O actions of consumers. The majority of the enterprises have distributed online digital coupons (in the Internet) to potential offline customers (in the real store) via smartphones. This fact also backs up that store selection is the most important step in the purchasing process for O2O.

In contrast, the in-store services with smartphones after store selection have currently not been popular. The enterprises are quite free from care when potential customers come to the real store. However, in the near future, they will have to provide these in-store services in order to differentiate among the competing stores when O2O spread in a larger scale and removes the distinction between the real store and the Internet shopping site. To aim the real O2O, retailers should give customers incentives for visiting real stores. Moreover, the data which is gathered in the O2O process is not effectively used for marketing at the moment (see the bars of Market research/data analytics and Point of sale in Figure 1). The features of smartphones (e.g., GPS, NFC) in addition to the usual Internet technologies enable sellers to grasp detailed movement of customers both in online and in offline (e.g., the flow/traffic line or the behavior pattern of purchasers). Enterprises should utilize such "big data" which is obtained in the O2O process for the further O2O activities. This cycle can be an iterative management method used in business for the continuous improvement of the O2O processes. It follows from what has been said that eReceipts will be the particularly key service.

Figure 2.    The virtual store of Tesco in the South Korea subway platform

## V.  Concluding Remarks

In this paper, we have proposed a consumer behavior model related to the use of smartphone features. Moreover, we have surveyed 73 cases of O2O and discussed the actual situation of O2O and the proposals for the future. The spread of smartphone use has changed consumer behavior and implemented practical O2O services. In order to achieve success, each enterprise must develop and provide a novel service according to purpose they aim to fulfill. For example, if improving name recognition is one company's purpose, the enterprise has only to develop an application focusing on offering users its contact information through GPS. Thus, the map supports changes in how retailers should behave during the O2O generation. Furthermore, enterprises can plan an unerring O2O strategy leading to O2O2O through consumers' smartphone use based on the map.

The ultimate goal of O2O2O is to establish competitive advantage. Nowadays retailers consider O2O2O services as advanced marketing strategies and aim to expand range of customers and business spheres by them. For example, the major British supermarket chain Tesco opened virtual stores in the South Korea subway platform (Figure 2). Tesco, as compared with the other supermarkets, is inferior in the number of the real stores, however, Tesco succeeds in an exploitative monopoly lock on commuters to provide novel customer experience of shopping with this service. We believe that the map help enterprises to create such innovative services with smartphones and their dissemination.

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