A Study on User Experience of Unmanned Payment Kiosk System in Fast Food Restaurants

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Abstract

Recently, domestic and foreign studies on the unmanned order payment system of the restaurant industry, which are rapidly growing recently, are insufficient. Therefore, there is a lack of understanding of users' perception of the unmanned order settlement system. The purpose of this study is to investigate the effect of user experience factors of unmanned order payment service of fast-food restaurants on satisfaction. Through this study, we can understand the psychology and behavior of users who use unmanned order settlement services and prepare a strategic foundation that can be used in various industries.

Keywords: Kiosk, Unmanned order payment system, User experience, Satisfaction, Use intention

1. Introduction

Installing automated, unmanned kiosk systems in public places is emerging as a new marketing method that allows businesses to attract new customers, reduce operation costs, and diversify services. Users can also benefit from kiosk systems in terms of rapid self-service and information acquisition [1].

The adoption of unmanned payment systems is one of the signals of a market change in fast-food restaurants. KFC, for instance, deployed kiosks in all of its regular stores with an exception of specialty stores in just one year after its first adoption of a kiosk system in 2017. KFC is the first case of 'installing 100 percent kiosks' among the major fast-food restaurants. Burger King and McDonald's are also increasing their kiosk installations. The industry considers that one kiosk plays a role of 1.5 staff members. Although kiosks are not a groundbreaking method to reduce labor costs, they are highly preferred because they reduce risks arising from face-to-face services [2].

The consumption trend is leaning towards unmanned services for familiarity and convenience as customers are familiar with online and mobile environments across all areas of their daily lives. From identifying product information to choosing a product and paying, customers can benefit from self-service that is rapid and convenient, and avoid the psychological pressure of having to deal with face-to-face communications. Therefore, the utilization of unmanned kiosks is expected to expand to diverse areas.

As diverse information service systems are becoming widely common, relevant user experience is increasingly important to measure system performance. However, there is an apparent lack of concrete research on how to measure such user experience. Especially

because the scope of the utilization of kiosks is consistently becoming wider, there has been relatively little interest in researching kiosks. In this background, there is a need to expand the scope of user experience research by researching kiosks and it is crucial to increase access and participation of users taking into consideration the nature of kiosks and the specificity of users, as kiosks are deployed in public places and used by unspecified individuals.

In this background, this paper aims to shed light on the impact of the factors of user experience of unmanned payment systems in fast food restaurants on user satisfaction and the relationship between user satisfaction and intention to continue to use the system. This study is expected to increase our understanding of user psychology and behavior in using unmanned payment systems and create a strategic foundation to be used in various industries.

2. Theoretical background

2.1. Current status of unmanned payment kiosk systems in fast food restaurants.

Touch screen kiosks are rapidly expanding to distribution/service industries such as fast-food restaurants and small restaurants. It is expected that a big change will take place in the offline foodservice industry based on new information communications technology (ICT). The "self-service" trend centered around food delivery apps and kiosks is likely to lead the unmanned service industry by diversifying order methods such as chatbots and QR codes.

Lotteria, the top fast-food restaurant chain, operates kiosks in 825 stores out of 1,350 stores (61%). After Lotteria's pilot tests of kiosks in its directly managed stores in 2014, it started receiving applications from its franchised stores for full-scale deployments in 2016. Also, McDonald's first introduced kiosks in 2015, and since then it has been operating kiosks in around 250 stores out of a total of 420 stores. Moreover, KFC headquarters is actively deploying kiosks: since its first adoption of kiosks in 2017, KFC completed installing kiosks in all of its regular stores with an exception of specialty stores such as those in ski resorts and baseball stadiums.

The industry analyzes that such change in the foodservice market is a result of interlocking of three elements: political and economic change (increase in the minimum wage), social and cultural change (preference of non-interactive methods), and scientific and technological change (advancement of simple payment systems and ICT).

There are a few precedent papers on unmanned payment systems that have been verified through empirical studies, although not many. For example, Misook Kim surveyed passengers who used airline kiosks systems in Incheon Airport and analyzed factors that affected customer satisfaction. She finds that the quality of information and the quality of handling problems have a significant impact on customers' intention to continue to use the system, rather than the quality of the system [3].

Li Lian (2016) analyzed the impact of the social presence of a chatbot sensed by the user during interaction with the chatbot on intention to recommend the service to others and use the service again. She finds that social presence and cognitive presence – which is a subfactor of social presence – have a positive impact on the reliability of the chatbot service and that higher reliability indicates higher intention to recommend the service to others and use the service again [4].

The existing studies on unmanned payment systems primarily focused on the convenience of the system (ex: Yeongchul Kwon, 2014; Senchen, 2014). There are also studies on the establishment of unmanned systems (ex: NaeHyuk Gyeong, 2011; Chulhwe Gu et al., 2011) and development of unmanned payment systems (ex: Oseok Kwon et al., 2012), and the

impact of chatbot and digital kiosks on intention to accommodate (ex: Jeongseng Baek, 2008; Sanju Hwang, 2009; Deokwha Yoon, 2010; Misook Kim, 2013; Li Lian, 2016) [5].

Despite the abovementioned existing studies, there is an apparent lack of studies on unmanned payment systems at home and abroad. Against this backdrop, this study is intended to conduct empirical research and analysis on psychological factors that attract users to unmanned payment systems and establish a logical theory that can lead to user preferences for unmanned payment systems as well as intention to use.

2.2. User experience evaluation

According to Wikipedia, user experience is a concept used in researches on user computer interaction and many principles of user experience are still derived from software and hardware development in the field of computer science. However, today this concept is widely applied not only to computer products but also across industrial services, products, processes, and society and culture.

Therefore, user experience is induced directly and on the whole through 'participation' of users, and products based on experience provide an environment in which users are given distinctive values to experience. That is, it not only includes a product to use but also an environment in which the user can experience it. Such an environment creates a frame to understand the user environment from the aspect of 'experience' and approaches user needs to provide a new and improved 'experience'. A derived experience from here restructures another experience, eventually building up and growing [6].

There is a wide range of elements of user experience that can create an optimum experience. Considering researchers' arguments, elements of user experience can be summarized into three aspects: 'usefulness', 'usability', and 'affect'. More specifically, Russell et al. (2007) identifies elements of user experience as 'perceptions', 'affect', 'attitudes', 'thoughts', and 'behaviors'.

Peter Morville suggests User Experience Honeycomb arguing that the characteristics of user experience are 'useful', 'usable', 'desirable', 'findable', 'accessible', 'credible', and 'valuable'. They are also used as key elements in recent analyses of user experience scales.

Mikahiltunen et al. suggest five elements of user experience. The relationship between each element can be marked with multiplication and the researchers argue that each element cannot fully complement other elements. The first element 'utility' refers to the user's recognition that the provided service is valuable. Recognizing the practical value of the service leads to identifying user experience as a more practical and valuable experience. There have already been several definitions given around the second element 'usability'. According to the Institute of Electrical and Electronics Engineering, 'usability refers to easiness: easy for the user to learn how to manipulate or input; easy to interpret the output of the system or its components'. The third element 'availability' refers to a fundamental element that allows the user to use the service. This element is as important as the stability of the service as it has a great impact on user experience if the user is unable to work a digital device whenever the user wants. The fourth element 'aesthetics' means the form of the service draws the user's interest or the user is emotionally attracted to the service. This element is the first thing that makes people interested in the product. The aesthetic aspect of a product or online service draws the interest of the user and also has an impact on the way we experience. The fifth element 'offline issues' includes main influential factors such as company brand, back-end process, and trustworthiness and this concept encompasses brands and supporting business processes.

User experience evaluation has several characteristics that are different from existing evaluations. First, user experience has overall characteristics that encompass usefulness, usability, and affect. Second, to evaluate user experience, one must experience using the product or service firsthand. Third, user experience is greatly affected by contexts of the actual use of the product or service. Therefore, it is important to evaluate the user experience on the spot where the product or service is used [7].

User experience evaluation can draw results through various methods such as Ethnography interviewing, usability test interviewing through the Likert Scale, and FGI. By analyzing such results, problems of UX design or solutions can be drawn intuitively. User research like this is a very important component of product and design development processes. Through this, future situations can be foreseen and deduced hypotheses can be used to solve problems [8].

3. Research scope and method

For the test of the research, kiosks in three popular fast-food restaurants in Korea were selected and the scope of users was limited to teenagers and people in their 20s considering their relatively frequent use of fast-food restaurants.

Survey including 24 questions based on factors that affect user experience which was drawn from theoretical considerations was used as a research method. Moreover, through result values, the extent of the impact of the factors of user experience on user satisfaction was identified and the impact of user satisfaction on intention to continue to use the system was analyzed.

4. Results

4.1. Survey participants

The survey was conducted for 7 days from October 14 to October 20, 2019. Participants were 198 male and female university students. The survey participants were those who have used unmanned payment kiosks in fast-food restaurants.

The questionnaire used was composed of two general questions, five usability test items, four usefulness test items, seven affect test items, four satisfaction test items, two intention test items, and a total of 24 questions.

Table 1. Unmanned payment kiosk user general (n=198)

	Category	%
Gender	Male	37.9%
	Female	62.1%
Frequency of unmanned payment kiosk	About once or twice a week	46.5%
	About once or twice a month	41.4%
	About once or twice every 2-3 months	9.1%
	About once or twice every six months	2.5%
	About once or twice a year	.5%

4.2. Analysis of UX and Satisfaction Survey Results of Unmanned Payment Kiosk

The variance analysis table of the multiple regression analysis on the satisfaction of unmanned payment kiosks is shown in [Table 2].

As a result of the statistical significance test of the model that measures users' satisfaction with three independent variables, the F-statistic value of the model including usability, usefulness, and effect was 296.762, and the probability of significance was .000. The explanation was made significantly in 05. The explanatory power of the user experience factor of the unmanned payment kiosk on satisfaction was 75.3%.

Table 2. Analysis of ANOVA for regression models(n=198)

	Sum of squares	Degrees of freedom	Mean square	F	p
Linear regression	90.015	2	45.007	296.762	.000
Residual	29.574	195	.152		
Sum	119.589	197			
R2(adj. R2)=.753(.750)					

As a result of testing the contribution and statistical significance of the unmanned payment kiosk, as shown in [Table 3], the usefulness and effect of the user experience at the significance level of .05 have a significantly positive (+) effect on the user's satisfaction. The usability did not have a significant effect on satisfaction.

Table 3. Multiple regression analysis on the satisfaction of unmanned payment kiosk(n=198)

Independent variable	Unstandardized Coefficients		Standardized Coefficients	t	p
	B	Standard error			
Usefulness	.48	.04	.55	12.79	.000
Affect	.50	.05	.43	9.92	.000
(Intercept)	.18	.16		1.15	.251

4.3. Analyze app user satisfaction and intention survey results

The results of a simple regression analysis on user intention of the unmanned payment kiosk are shown in [Table 4].

As a result of testing the statistical significance of the model that predicts the continuous use intention by user satisfaction of unmanned payment kiosk, F statistical value is 604.84, significance probability is .000, and user satisfaction is significant level at .05. The figure was significantly explained (t=24.59, p=.000).

Table 4. Regression analysis on the intention to use unmanned payment kiosk(n=198)

Dependent variable	Unstandardized Coefficients		Standardized Coefficients	t	p
	B	Standard error			
Satisfaction	.98	.04	.87	24.59	.000
R2(adj. R2)=.755(.754), F=604.84					

5. Conclusion

The findings of this study indicate that the use of user experience and affect have a significant impact on user experience and that usability does not have a significant impact. Therefore, it can be understood that usefulness meets the user's expectations along with emotional satisfaction from user satisfaction in using unmanned payment kiosk systems.

Recently, due to the increased standardization of technology, elements related to function and utility have already become fundamental elements. Therefore, rather than easiness in terms of usability, the focus should be on credibility that makes the user believe that using a kiosk will increase work efficiency.

The findings of this study suggest that kiosk user satisfaction has a significant impact on intention to continue to use the system. That is, positive performance of unmanned payment kiosk systems through useful, credible and emotionally satisfying UX design can contribute to increased user satisfaction which in turn encourages the user to use the system again.

Acknowledgments

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