

Research on the Personal Characteristics on Airline Self-Service Technology: Using Extended Technology Acceptance Model

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확장된 기술수용모델을 활용한 항공사 셀프서비스기술 연구

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Abstract This study intended to examine how customers of self-service technology of airlines perceive and adopt the technology, and how such perceptions affect their willingness to use it. The findings of analysis are as follows. First of all, self-efficacy, a personal characteristics variable, has significant effects on both perceived usefulness and ease of use (H1). Second, though personal innovation which accepts new information technology more positively and challenge to use it before others has significant effect on perceived usefulness (H 2-1), it does not have significant effect on ease of use (H 2-2). Third, perceived ease of use has effect on perceived usefulness. Forth, both perceived usefulness and ease of use have positive effects on willingness to use.

Key Words : Self-Service Technology, Personal Characteristics, Self-efficacy, Personal Innovation, Technology Acceptance Model, Willingness to use

요 약 본 연구에서는 항공사 셀프서비스기술의 주체인 고객이 항공사 셀프서비스 기술을 어떻게 인지하고 수용하며 사용의도에 영향을 미치는지 확인하고자 하였다. 분석결과는 아래와 같다. 먼저, 항공사SST 사용자의 개인적 특성변수인 자기효능감은 지각된 유용성과 사용용이성에 모두 유의한 영향을 미치는 것으로 분석되었다(H 1). 둘째, 새로운 정보기술을 보다 긍정적인 태도로 수용하며, 먼저 사용하려고 도전하는 개인의 특성인 개인혁신성은 지각된 유용성에는 유의한 영향을 보였지만(H 2-1), 사용용이성에는 유의한 영향을 미치지 않는 것으로 분석되었다(H 2-2). 셋째, 지각된 사용용이성은 지각된 유용성에 유의한 영향을 미치는 것으로 나타났다. 즉 사용방법을 쉽게 배우고 사용이 용이하다고 느낄수록 SST 사용 수행성과를 향상시키고 있음을 알 수 있다. 넷째 지각된 유용성과 사용용이성은 모두 사용의도에 긍정적인 영향을 미치는 것으로 분석되었다.

주제어 : 셀프서비스기술, 개인적특성, 자기효능감, 개인혁신성, 기술수용모형, 사용의도

1. Introduction

Development of information technology has allowed consumers to directly interact online

with firms, and, firms to provide numerous products and services to customers without limits of space and time. Airlines also provide technology-using services, with KIOSK a typical

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one, the unmanned ticketing and check-in machine. Kiosk is one of SST (self-service technologies), providing comprehensive services including not only check-in, but ticketing, reservation on tickets departing on that day, allocation of preferred seats, and issue of boarding pass and receipt, etc.

Using such a SST, customers are now able to deal with flight-related matters more conveniently and effectively than before[1]. While air passengers have continuously increased, the Korean air transport business is under serious financial pressure and competition due to rising fuel prices and advent of low-cost carriers. To deal with external factors like rising fuel prices and disasters, existing airlines seek cost-reducing mechanisms internally, and adoption of IT is a way of reducing personnel costs. SST is all the technological means which allow customers to generate service for themselves without meddling of employees[2].

IATA (International Air Transport Association) recommends airlines to establish programs to simplify major components of air transport, to install standardized CUSS (common use self-service) in the airport to reduce cost through automation. In Korea, from March 2007, CUSS KIOSK has been installed in airports for various airlines to share, and the CUSS KIOSK allows customers to finish boarding procedure simply by scanning passport or the bar code of e-ticket received by e-mail, or mobile phone[3]. In spite of such spread of information and communication technologies, customers are hesitant to accept the new technology[4]. Unless customers are ready to accept a new technology, it cannot be used. So, it is important to know personal characteristics of customers related with spontaneous and active participation of users[5].

Personal characteristics means spontaneous willingness of an individual to test new information technology and it consists of personal innovation and self-efficacy. Personal

innovation means "the degree to which a person adopts innovation earlier than other members in a social system" and self-efficacy means "evaluation of or belief in one's own ability about how much one can manage and perform one's behavior in using self-service technology"[6]. In general, highly innovative persons positively perceive relative benefit, use convenience, and compatibility, etc., they are willing to use new IT or system[1,7]. That is, while highly innovative people tend to have open attitude to new technology, those who are lower in innovation fear changes and perceive new technology as threatening[8]. Self-efficacy is personal belief that one has techniques and ability to perform given projects[9] and one's evaluation on personal capacity in using information and computer[10]. Namely, self-capacity on SST is one's confidence that one can use SST and perform work conveniently and perform works more conveniently using SST.

Meanwhile, in measuring how consumers adopt new technologies, there are two models: TRI (technology readiness index) and TAM (technology acceptance model). TRI is tendency of consumer to adopt and use new technology[11] and TAM is intention of consumers to use products or services containing new technology[12,13]. TAM is a model developed to explain and predict user's behavior on IT based on theory of reasoned action[12,14]. TAM is the relationship between attitude to use new technology and real use of it using perceived ease of use and perceived usefulness which work as preceding factors affecting use of new technology[12,15,16]. When every other is equal, what is easy to use is more useful. Thus, ease of use affects usefulness, and perceived ease of use and perceived usefulness can be affected by external variables[17].

Perceived usefulness, a core concept of TAM, is defined as the degree to which one believes that using a specific technological system will

improve performance of work[12] and it is the degree to which one believes that use of a specific technology will give more satisfaction to himself or herself. That is, perceived usefulness is subjective attitude on the degree to which new technology can contribute to goals and performance of an organization, rather than objective measurement of them. This, it is perceived evaluation on effectiveness of new technology. Accordingly, perceived usefulness in using SST is the belief that SST will help himself or herself in doing work more quickly and conveniently, and perform the work more effectively, and that using the SST is more useful. And such perceived usefulness has proved to be important. Curran & Meuter (2005) showed that perceived usefulness is a factor affecting attitude on SST[18], Pikkarainen et al. (2003), in their study on factors affecting adoption of online banking, proved that the most important reason for why people use it is perceived usefulness[19]. Lu et al. (2003) argued that customers who recognized usefulness of mobile internet accept SST more actively[20].

Perceived ease of use is the degree to which one believes that a specific system helps one save physical and mental efforts[12] and that one does not need to make much efforts in using a specific technology. Accordingly, perceived ease of use in using SST is the belief that as using SST or learning how to use it is easy, it is easy to use SST. In general, if it is easy to use a system, it will save users' efforts, which will increase the possibility that users accept and use it. Yen (2005) argued that what potential users of SST consider as the most important is ease to use[21], Meuter, et al (2000) mentioned that ease to use affects customer satisfaction, and that simple and easy treatment process of SST makes it possible to deliver valuable service to customers[2].

This study is based on previous researches showing importance of personal characteristics, given that SST becomes effective when users

actively and voluntarily participate in using it. As external variables affecting perceived usefulness and perceived ease of use, this study expanded the TAM by choosing personal characteristics variables of users: self-efficacy and personal innovation. Self-efficacy on SST is personal belief that one can easily use SST and personal innovation is open and positive attitude, which facilitates one to adopt SST earlier than others. Thus, expecting that those who are high in self-efficacy and personal innovation will be also high in perceived usefulness and ease of use of the SST, this study set the following hypotheses.

Hypothesis 1-1: Self-efficacy will have significant positive effects on perceived usefulness.

Hypothesis 1-2: Self-efficacy will have significant positive effects on perceived ease of use.

Hypothesis 2-1: Personal innovation will have significant positive effects on perceived usefulness.

Hypothesis 2-2: Personal innovation will have significant positive effects on perceived ease of use.

Hypothesis 3: Perceived ease of use will have significant positive effects on perceived usefulness.

Hypothesis 4: Perceived usefulness will have significant positive effects on willingness to use.

Hypothesis 5: Perceived ease of use will have significant positive effects on willingness to use.

2. Materials and Methods

The population of this study is customers who have used airline SST among Koreans in Incheon International Airport. The survey was conducted to customers who used self-bag drop counters which can be used by customers who have already been issued tickets through Internet or airport KIOSK and departure gates to flights to America and Europe to which SST is relatively more activated. The survey was done using copies of the questionnaire. Those copies were distributed after explaining the goal of the

survey. The survey was done from November 4 to 11, 2018 at the 2nd terminal of Incheon International Airport. Before designing the questionnaire, this study did pre-test of it, eliminating ambiguous expressions or difficult terms within it. A total of 250 copies were distributed and 217 copies were retrieved. Of these, 208 copies were used for the analysis, except for the nine copies, which were inadequate.

The statistical programs used for analysis were SPSS 22.0 and AMOS 21.0. First, frequency analysis was done to figure out demographic characteristics of variables. Second, to test validity and reliability of measurement variables, confirmative factor analysis was done. Finally, to test hypotheses, this study suggested path coefficients in structural equations to examine effects of external variables on internal variables.

3. Empirical Analysis

3.1 Demographic characteristics

Table 1. Demographic characteristics

Distinction		Frequency	%
Type of travel	Individual trip	150	72.1
	Package tour	58	27.9
Purpose of travel	tourism	133	63.9
	business trip	75	36.1
Kind of SST	Internet Check-in	99	47.6
	Airport KIOSK	109	52.4
Age	20-29	102	49.0
	30-39	67	32.2
	40 and above	39	18.8
Education	High school	18	8.6
	2-year college graduates	53	25.5
	Undergraduate school	120	57.7
	Graduates	17	8.2
Route	Asia	122	58.6
	Europe	54	26
	America	32	15.4
Frequency of SST use	1-2	67	32.2
	3-4	76	36.5
	5 and over	65	31.3
Total		208	100

The demographic characteristics of this study are shown in Table 1. The age group is the most in the 20s (49%), followed by 32.2% in the 30s. Undergraduates and 2-year college graduates account for more than 80%. The frequency of SST is evenly distributed 1-2, 3-4, 5 times. In other words, tourists in their 20s are most likely to use SST.

3.2 Reliability

This study set the relationships between variables based on previous researches, and did confirmatory factor analysis to confirm reliability and validity of such relationships. The main purpose of CFA is to test convergent validity and discriminant validity. In the fit of analysis, if χ^2 (chi-square) is $p > 0.05$, it is judged that the data of population is proper[22].

After choosing and sophistication of measurement items, this study did reliability test using construct reliability of the model. All the construct reliabilities were over 0.8, high reliabilities. When items damaging convergent validity were eradicated through CFA, GFI was as follows: $\chi^2 = 777.604$ ($df = 224$, $p = 0.000$), $RMR = 0.033$, $GFI = 0.899$, $AGFI = 0.877$, $NFI = 0.909$. GFI of CFA is the values after items damaging validity were eradicated. It was found that except for χ^2 value which is sensitive to the sample size, all the values are acceptable[22].

Standardized factor loadings linking measurement items and related factors are all over 0.5, and AVE, measuring the amount variance is explained by variables, is also over 0.50. t value is acceptance level, over ± 1.96 , confirming convergent validity of measurement items. The results of the CFA are presented in Table 2, and the discriminant validity analysis is presented in Table 3.

Table 2. Confirmatory Factor Analysis for the measurement model

Factor	ITEM	Std. factor loading	t Value	SMC	AVE
Self-efficacy	SE 1	.787	---	.669	.564
	SE 2	.811	18.111**	.716	
	SE 3	.700	18.411**	.700	
	SE 4	.728	17.135**	.773	
Personal innovation	PI 1	.634	---	.708	.578
	PI 2	.665	16.268**	.711	
	PI 3	.877	16.228**	.778	
	PI 4	.857	17.755**	.809	
Perceived usefulness	PU 1	.814	---	.709	.645
	PU 2	.662	15.648**	.704	
	PU 3	.598	16.158**	.712	
Perceived ease of use	PEU 1	.645	---	.708	.664
	PEU 2	.710	15.263**	.611	
	PEU 3	.802	16.122**	.712	
Willingness to use	WU 1	.667	---	.700	.589
	WU 2	.837	15.178**	.810	
	WU 3	.811	17.112**	.884	
	WU 4	.848	17.133**	.888	

Table 3. Correlation Matrix

	A	B	C	D	E
Self-efficacy: A	.750-				
Personal innovation: B	.442	.760			
Perceived usefulness: C	.565	.321	.803		
Perceived ease of use: D	.227	.331	.301	.814	
Willingness to use: E	.413	.442	.309	.447	.767

all correlations are significant at $p < 0.01$ (2-tailed), diagonal value: square root AVE

3.3 Results

To analyze the research model, this study used AMOS 22.0 to suggest path coefficients and examine the effects of independent variable to dependent variables. The results of the structural equation model are shown in Table 4. Goodness-of-fit test of the research model showed the followings: $\chi^2 = 1533.11$, $df = 397$, $NFI = 0.910$, $CFI = 0.902$, $GFI = 0.923$, and $AGFI = 0.890$, proving that the model has proper goodness-of-fit. The findings of hypothesis tests of this study are as follows. First, hypotheses 1-1 and 1-2 that personal characteristics will have significant effect on perceived usefulness were all adopted. Self-efficacy has path coefficient 0.289 ($t = 4.775$) on perceived usefulness (hypothesis 1-1), and self-efficacy has path coefficient 0.208 ($t = 3.298$)

on perceived ease of use (hypothesis 1-2). In hypothesis 2-1, personal innovation has path coefficient 0.267 ($t = 4.521$) on perceived usefulness, and its t value is over ± 1.96 , so it was adopted. In contrast, personal innovation has path coefficient 0.071 ($t = 0.776$) on perceived ease of use and, as its t value did not satisfy the requirement ± 1.96 , it was rejected. Hypothesis 3 that perceived ease of use of SST will have significant positive effects on perceived usefulness of it was adopted, because its path coefficient was 0.303 ($t = 2.612$). Hypothesis 4 that 'perceived usefulness of SST will have significant positive effects on willingness to use' was adopted, because its path coefficient was 0.416 ($t = 3.362$). Finally, hypothesis 5 that 'perceived ease of use of SST will have significant positive

Table 4. Structure model path analysis

H	Path	Estimate	S.E	C.R	P value
1-1	Self-efficacy --> Perceived usefulness	.289	.061	4.775**	.000
1-2	Self-efficacy --> Perceived ease of use	.208	.068	3.298**	.000
2-1	Personal innovation --> Perceived usefulness	.267	.052	4.521**	.000
2-2	Personal innovation --> Perceived ease of use	.071	.102	0.776	.320
3	Perceived ease of use --> Perceived usefulness	.303	.111	2.612**	.002
4	Perceived usefulness --> Willingness to use	.416	.121	3.362	.003
5	Perceived ease of use --> Willingness to use	.217	.232	2.277**	.001

effects on willingness to use' was adopted, because its path coefficient was 0.217 ($t=2.277$).

4. Conclusion

This study intended to examine how customers of self-service technology of airlines perceive and adopt the technology, and how such perceptions affect their willingness to use it. To examine it, this study used TAM (technology acceptance model), which is used to measure attitude of consumers to accept new technology. Considering that SST becomes effective when users voluntarily and actively participate in it, this study expanded the TAM by adding personal characteristics of users. The findings of analysis are as follows.

First of all, self-efficacy, a personal characteristics variable, has significant effects on both perceived usefulness and ease of use (H1). Consequently, we can assume that those of high self-efficacy, or those who think they can use SST of airlines easily and who are confident that they can understand it easily tend to perceive that airline SST is useful and easy to use it.

Second, though personal innovation which accepts new information technology more positively and challenge to use it before others

has significant effect on perceived usefulness (H 2-1), it does not have significant effect on ease of use (H 2-2). Such findings can be understood that even innovative people who know more about new technology than others and use it before others, though they perceive its usefulness, do not think they can quickly learn and use it. That is, those who are highly innovative do not perceive that it is easy to learn to use the new technology, even if they perceive usefulness of it.

Third, perceived ease of use has effect on perceived usefulness. Namely, the more one perceive that he or she can easily learn how to use a new technology the more one can use it.

Forth, both perceived usefulness and ease of use have positive effects on willingness to use. Namely, the more one perceives that one can do business quickly without having to wait for a long time on line, and that the procedure is simplified, the more one tends to think airline SST positively, and recommend it to one's neighbors. Such findings lead us to suggest the following scholastic and practical offerings. First, as SST is new to Korean airlines, there have not been many researches on it, and on how customer accepts it. Accordingly, this research on understanding of flight and acceptance of new technology in airline business is timely, and scholastically significant. In addition, as air

transport business takes a core position in tourism business, contributing to the business to a great extent, this kind of research can contribute greatly to tourism business.

In practice, to promote use of SST among customers, information provided through SST should be accurate, and users should be able to use it conveniently. In the aspect of technology of unmanned ticketing machine, the service should be designed or guided for customers to be able to use it easily, to make customers get familiar to it without fearing it.

In the aspect of personal characteristics, for the customers who do not have resistance to new technology and are confident of using it, it seems necessary for airlines to introduce new technologies and recommend using them. Particularly, this study suggests a marketing strategy targeting those in their 20s and 30s who are not very fearful of new technologies and open-minded and positive in accepting them. In addition, it seems also necessary for those working in publicity and information desks to guide customers to use kiosks, and reduce anxiety or inconvenience of them to use it. It seems also necessary to consider evaluating technology acceptance attitude of airline workers to improve ease of use of customers.

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