

Individual behaviour towards mobile services acceptance in the airline sector: A survey in Saudi Arabia

1. Introduction:

Mobile commerce, concept commonly referred to m-commerce, has been defined by Balasubramanian et al. (2002) as any mobile electronic business that takes place, anywhere and anytime. Others, such as Kalakota and Robinson (2002), define mobile commerce as the use of wireless devices (mostly mobile phones) to perform electronic business transactions, such as product orders, money transfers, and ticket purchases. Abu Bakar and Osman (2005) defined m-commerce as the exchange of goods and services via wireless mobile phones.

Varshney and Vetter (2002) have viewed m-commerce as an ecommerce using wireless devices. Khalifa and Shen (2008) argued that m-commerce is likely to experience a significant growth for a number of reasons, including the wide growth in mobile device adoption and the clear advantages of 'anytime, anywhere' connectivity. Moreover, the positive advantage of m-commerce is driven by its unique features and characteristics which can provide customers with added value (Siau et al, 2001; Sharma and Deng, 2002; Tang and Veijalainen, 2001) that do not exist in traditional e-commerce. These features include ubiquity, 'anytime, anywhere' access, personalization, flexibility, localization, and the ability to access desired information .

Despite the widespread growth of mobile technologies and applications which have been developed for mobile commerce, poor user acceptance of new information technology seems to be a barrier to the successful adoption of such new technologies (Wu and Wang, 2005). Previous studies conducted to explore the constructs which affect m-commerce adoption were mostly tested in USA, China, and Taiwan (Wei et al, 2009). Thus, the purpose of this paper is to fill the present research gap in the middle east region by practically proposing and testing a model to clarify the constructs that cause customers to adopt mobile services in Saudi Arabia and especially in the airline sector. As Wei et al (2009) claimed, there is a general lack of empirical research into mobile commerce acceptance and adoption by customers .

2. Literature review and hypothesis:

Davis (1989) presented TAM as an adaptation of TRA specially modified to model user acceptance of information systems. Davis uses TRA as a theoretical foundation to determine the underlying relations among two key beliefs: perceived usefulness and perceived ease of use, and users' attitudes, intentions and actual computer adoption behaviour.

Chen et al (2009), in their review of the Technology Acceptance Model, demonstrated that new factors are added by researchers and implemented in different contexts. Lee (2009) joined TAM and TPB with perceived risk and perceived benefit to clarify the adoption of internet banking, Chen et al. (2009) implemented TAM, TPB and technology readiness to understand users self-service technologies adoption. Chen et al. (2009) integrated TPB, TAM and technology readiness to offer an integrated model which explained customers' continues use of self-service technologies. Walczuch et al. (2007) and Lin et al. (2007) incorporated technology readiness with the TAM, whilst Chiu et al. (2005) included personal innovativeness. Furthermore, Gefen et al. (2003) extended the TAM by adding trust. Subjective norms have been integrated to TAM by Venkatesh and Davis (2000). Rogers (1995) identified innovation as an idea, practice or object that is perceived as new by an individual or other unit of adoption, stating that there are five perceived attributes of an innovation that can determine the rate of adoption: (1) relative advantage, (2) compatibility, (3) complexity, (4) trialability, and (5) observability. Previous research to explain information

technology adoption has applied the innovation diffusion theory in general (Karahanna et al., 1999) and mobile commerce specifically (Wu and Wang, 2005). In addition, (Koenig-Lewis et al., 2010) stated that several studies of customers acceptance or adoption of new technologies have developed and used their proposed models, based on TAM and IDT (Taylor and Todd, 1995; Igarria et al., 1995). These have been heavily used in e-commerce acceptance (Koufaris, 2002; Chen et al., 2004; Gefen and Straub, 1997) and also in some studies of m-commerce acceptance (Koivumaki et al., 2006; Luarn and Lin, 2005; Alda's-Manzano et al., 2009). A pilot study was conducted to test the proposed model (Algethmi, De Coster, 2012) and one factor was eliminated (use situation) due to a Cronbach's alpha lower than 0.07 as suggested by Pallant (2007).

Figure(1) describes the proposed model and the related hypothesis as follows :

2.1 Perceived ease of use:

Davis (1989) defined perceived ease of use as the level to which a person thinks that using a particular system would be free of effort. Wei et al. (2009) stated that previous studies have considered perceived ease of use as a significant determinant in information technologies adoption, such as online banking (Jahangir and Begum, 2008; Guriting and Ndubisi, 2006), and m-commerce (Luarn and Lin, 2005; Wang and Barnes, 2007; Mallat et al., 2006; Lin and Wang, 2005; Kurnia et al., 2006;). Therefore, we hypothesis that:

H2. Perceived ease of use has a positive effect on consumer intention to use m-commerce in Saudi Arabia.

2.2 Perceived usefulness:

Davis (1989) identified perceived usefulness as the extent to which an individual believes that using a specific system would improve his or her job performance. Several studies have validated the consequence of perceived usefulness on intention to use new technologies (Lin and Wang, 2005; Luarn and Lin, 2005). Ho and Kwok (2003) demonstrated that this factor not only helped to enhance an individual's performance in their daily actions but can assist the users in achieving effectiveness and efficiency. A study conducted by Wong and Hiew (2005) recommended that the usefulness of mobile services is a strong driver for m-commerce usage. Therefore, we hypothesis that:

H1. Perceived usefulness has a positive effect on consumer intention to use m-commerce in Saudi Arabia.

2.3 Compatibility:

According to Rogers (1995), compatibility is defined as "the degree to which an innovation is perceived as being consistent with the existing values, past experiences and needs of potential adopters". Several studies have incorporated compatibility into the TAM model in the context of m-commerce (Wu and Wang, 2005) and m-payment (Chen, 2008). It is argued that compliance of innovation with way of life for users results in a faster adoption rate (Rogers, 1995). Therefore, we hypothesis that:

H3. Compatibility has a positive effect on consumer intention to use m-commerce in Saudi Arabia.

2.4 Mobility:

Mobility is defined as the capability of accessing services 'anytime, anywhere' via mobile phones or other devices and wireless networks (Mallat et al., 2006; Coursaris and Hassanein, 2002). Mobile phones enable users to access different services and information without the

need to visit specific internet access centres (May, 2001; Mallat et al., 2006). (Mallat et al., 2006), employing the term 'mobility' to state the benefits of 'anytime, anywhere' service access. Therefore, we hypothesize that:

H4. Mobility has a positive effect on consumer intention to use m-commerce in Saudi Arabia.

2.5 Social Influence:

It is argued that social influence is a factor equal to subjective norm, which can be added to both the theory of planned behaviour and theory of reasoned action, with both theories speculating that social influence can be perceived as a significant determinant in usage and technology acceptance (Lu et al., 2003; Rao and Troshani, 2007).

According to Ajzen (1991), subjective norm is defined as "the perceived social pressure to perform or not to perform the behaviour". Khalifa and Cheng (2002) found that social influence had a strong effect on consumer intention to use m-commerce. Therefore, we hypothesize that:

H5. Social influence has a positive effect on consumer intention to use m-commerce in Saudi Arabia.

2.6 Personal innovativeness:

Personal innovativeness defined as the individual willingness to attempt to adopt and use new technology and or new information system for a achieving a particular aims. (Rao and Troshani, 2007; Bhatti, 2007). Citrin et al. (2000) in their research reported that the consumer adoption of internet shopping is influenced by personal innovativeness. Therefore, we hypothesize that :

H7: personal innovativeness has a positive effect on consumer intention to use m-commerce in Saudi Arabia.

2.7 Perceived risk:

Pavlou (2003) identified perceived risk as the belief of individuals about the probability of suffering a failure in achieving a target. It has been discussed that high perceived risk has a negative effect on the adoption of new technologies, such as wireless finance (Kleijnen et al., 2004) and m-commerce (Wu and Wang, 2005).

Lovelock et al. (2001) presented a negative correlation between willingness and service technology adoption, where the highest adoption occurred when the usage risk is low. Therefore, we hypothesize that:

H6. Perceived risk has a negative effect on consumer intention to use m-commerce in Saudi Arabia.

3. Methodology:

The major aim of this research is to test the hypothetical relationships presented and to validate the proposed model. A cross-sectional survey was conducted in Saudi Arabia by developing a questionnaire. This questionnaire, as an information-gathering tool, is divided into three sections. The first section is about the demographic characteristics, including gender, age, nationality and level education, while the second part relates to the proposed model constructs of perceived ease of use, perceived usefulness, social influence, compatibility, mobility, perceived risk and behavioural intention. The survey used 1 to 7 Likert Scales to study the respondents behaviour for these factors, where 1 indicates "strongly disagree" and 7 indicates "strongly agree". The third part is concerned with general travel characteristics.

3.1 Sample and survey procedures:

The data for this research was obtained through the use of an e-mail survey of industrial contact in both the public and private sectors in Saudi Arabia. Email invitations were distributed and the participants were asked to volunteer to complete the web-based questionnaire which was sent during the period July-September 2012. The sample of e-mail addresses was selected using (snowball/convenient) sampling. The e-mail invitations which were sent to these addresses, explained the purpose of the survey and invited the recipients to participate in the research. The respondent would then complete the questionnaire, which had a survey link hosted on the survey monkey server. The survey took approximately ten minutes to complete and the data were collected at the end of the survey when the respondents clicked the submit button.

3.2 Measures:

The constructs in this research were developed from the related literature and modified for the context of mobile commerce when needed. Perceived ease of use, perceived usefulness and compatibility items were taken from a number of sources (Davis, 1989; Davis, 1993; Moore and Benbasat, 1991; Taylor and Todd, 1995; Mallat et al, 2006; Venkatesh et al, 2003). Mobility items (Kleinrock, 1996; Kakihara and Sørensen, 2001), social influence items (Campbell, 2007; Taylor and Todd, 1995), perceived risk items were derived from other previous studies (Zhang and Prybutok, 2005; Sweeney et al., 1999), and Personal innovativeness measurements are adapted from (Agarwal and Prasad, 1998). Behavioral intention items were taken from Thompson et al (1994), Taylor and Todd (1995) and Venkatesh et al (2003).

4. Analysis and results:

4.1 Respondents profile:

Table (1) shows that the sample size consists of 307 respondents in Saudi Arabia: 87.3% (268) of the respondents are men and 12.7% (39) are women. Most of respondents (135 or 44%) are aged between 30 and 39 years; 91 (29.6%) are between 40 and 49; 36 (11.7%) are between 21 and 29, and 11%, 3% are in the age range 50 to 59 years, and 60 plus respectively. The majority (44.6%) of respondents hold a Bachelor degree; 36.8% have Master's degrees; 10.1% have PhD or higher education, and 4.6% and 3.9% are Diploma holders, and high school or below respectively. The vast majority (256) of respondents are Saudi, while (51) are non-Saudi but working in Saudi Arabia. Moreover, most of the respondents (206) have a very good knowledge of the internet, with 85 who are good. 36.8% of respondents use the internet for more than four hours per day, 32.2% between three and four hours per day, and 30.9% use the internet for one to two hours per day.

4.2 Scale reliability:

SPSS (v.18.0) is used to analyze the data to obtain descriptive statistics, and the reliability of the questionnaire was tested using Cronbach's alpha measurements. The reliability coefficients alpha of all variables range from 0.769 to 0.963, which is beyond the suggested value of 0.70 (Pallant, 2007). The following are described in table (2): BI (0.963); SI (0.954); EoU (0.945); Usefulness, Comp, Mob (0.945), Comp (0.918); Usefulness (0.917); Mob (0.903), PR (0.840), and PI (0.769).

4.3 Correlation analysis:

A composite variable was used, based on the average score of multi-items for the constructs in the framework, as each construct was measured by several items in the questionnaire. This will be used in further analysis, such as regression and correlation (Wang and Benbasat, 2007; Wei et al, 2009). Pearson r correlation was run to determine the relationship between independent variables (EoU, Usefulness, Mob, Com, SI, PI, PR) and the dependent variable (BI). Cohen (1988, pp79-81) suggests that the correlation coefficient value (r) range from 0.10 to 0.29 is considered weak, from 0.30 to 0.49 is medium, and from 0.50 to 1.0 is strong. Results show that there was a strong, positive correlation and statistically significant between Eou ($r = .512, n=307, p < 0.01$), Usefulness, Mob, Comp ($r = .726, n=307, p < 0.01$), SI ($r = .509, n=307, p < 0.01$), PI ($r = .556, n=307, p < 0.01$) and Behavioural Intention to use mobile services. However, perceived risk ($r = -.112, n=307, p < 0.05$) was correlated to behavioural intention to use mobile services negatively, as shown in table (3).

4.4 Factor analysis & Multiple Regression results:

Construct validity is assessed by factor analysis in this research, and principal components extraction with varimax rotation was run on 23 items. The Kaiser-Meyer-Olkin (KMO) value of 0.925 and significance of Bartlett's statistic Chi-Square = 9132.834 ($p < 0.001$) confirm the suitability of the factor analysis for the data set.

Tables (4) and (5) illustrate the factor loading for every item. All 30 items are clustered into six factors: Factor 1 (Mob, Usefulness, Comp), Factor 2 (Eou), Factor 3 (BI), Factor 4 (SI), Factor 5 (PI) and Factor 6 (PR). The Eigenvalue for each factor is greater than 1.0 (13.445, 2.566, 2.413, 2.121, 1.603, 1.127). The cumulative percentage of variance explained by the six factors is 77.582 per cent.

Additionally, Multiple regression analysis is applied to investigate the association between a single dependent variable and Number of independent variables (Hair et al., 2005; Pallant, 2010).

The results in Table (6) show that Usefulness, Mob, Comp ($p < 0.05$), PI ($p < 0.05$), Eou ($p < 0.05$) and SI ($p < 0.05$) all significantly affect the behavioral intention towards mobile services. However, PR was found not to be significantly linked to the behavioral intention to use mobile services in Saudi Arabia.

5. Conclusion and discussion:

This research explains the results from testing mobile services acceptance in the airline sector in Saudi Arabia by implementing technology acceptance and innovation diffusion theories as a base for this study, and has integrated them with other constructs such as social influence and perceived risk.

The results obtained from this research show support for the above mentioned theories, and perceived usefulness, mobility, Compatibility as a combined variable was found to be the most significant predictor for behavioural intention to use mobile services. Moreover, perceived ease of use was shown to have a direct significant effect on mobile services acceptance. Results also provide evidence for a significant effect of social influence on consumer acceptance of mobile services. Furthermore, personal innovativeness was found to be a significant determinant for behavioural intention to use mobile services, whereas perceived risk was found insignificant in terms of predicting the behavioural intention to use mobile services in Saudi Arabia. The results also confirm the appropriateness of factor analysis for the data set. This is described as a revised model in figure 2.

Appendices

Characteristics	Frequency	%
Gender:		
Male	268	87.3
Female	39	12.7
Age group:		
21-29	36	11.7
30-39	135	44.0
40-49	91	29.6
50-59	35	11.4
60+	10	3.3
Educational level:		
High school or below	12	3.9
Diploma	14	4.6
Bachelor	137	44.6
Master degree	113	36.8
PhD or higher	31	10.1
Nationality:		
Saudi	256	83.4
Non-Saudi	51	16.6
Internet knowledge:		
Moderate	16	5.2
Good	85	27.7
Very good	206	67.1
Internet usage per hours per day:		
1-2 hours	95	30.9
3-4 hours	99	32.2
>4 hours	113	36.8
N =307	307	100%

Table 1: Respondents' Profile

Construct name	Number of items	Cronbach's alpha
Behavioural intention (BI)	5	0.963
Social influence (SI)	4	0.954
Ease of use (EoU)	4	0.945
Usefulness,Compatibility,Mobility	10	0.945
Compatibility (COMP)	3	0.918
Usefulness (USE)	4	0.917
Mobility (MOB)	4	0.903
Perceived risk (PR)	3	0.840
Personal Innovativeness (PI)	4	0.769

Table 2: Scale Reliability

Correlations

N(307)		EoU	SI	PR	PI	USEFULNE SS.MOB.CO MP	BI
EoU	Pearson Correlati on Sig. (2- tailed)	1	.342 .000	-.111 .051	.240 .000	.633 .000	.512 .000
SI	Pearson Correlati on Sig. (2- tailed)	.342 .000	1	-.019 .741	.239 .000	.505 .000	.509 .000
PR	Pearson Correlati on Sig. (2- tailed)	-.111 .051	-.019 .741	1	-.129 .023	-.120 .035	-.112 .049
PI	Pearson Correlati on Sig. (2- tailed)	.240 .000	.239 .000	-.129 .023	1	.443 .000	.556 .000
USEFULNESS.MOB.C OMP	Pearson Correlati on Sig. (2- tailed)	.633 .000	.505 .000	-.120 .035	.443 .000	1	.726 .000
BI	Pearson Correlati on Sig. (2- tailed)	.512 .000	.509 .000	-.112 .049	.556 .000	.726 .000	1

Table 3 : Correlation Matrix

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.925
Bartlett's Test of Sphericity	Approx. Chi-Square	9132.834
	df	435
	Sig.	.000

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	13.445	44.815	44.815	13.445	44.815	44.815
2	2.566	8.553	53.368	2.566	8.553	53.368
3	2.413	8.043	61.411	2.413	8.043	61.411
4	2.121	7.071	68.482	2.121	7.071	68.482
5	1.603	5.342	73.824	1.603	5.342	73.824
6	1.127	3.758	77.582	1.127	3.758	77.582
7	.821	2.737	80.319			
8	.754	2.514	82.833			
9	.617	2.056	84.889			
10	.512	1.707	86.596			
11	.469	1.562	88.158			
12	.405	1.350	89.507			
13	.315	1.049	90.556			
14	.307	1.025	91.581			
15	.267	.889	92.469			
16	.257	.858	93.327			
17	.235	.785	94.112			
18	.212	.706	94.817			
19	.204	.681	95.498			
20	.182	.608	96.106			
21	.181	.604	96.710			
22	.162	.540	97.250			
23	.156	.518	97.769			
24	.148	.494	98.262			
25	.112	.375	98.637			
26	.105	.351	98.988			
27	.090	.301	99.289			
28	.082	.275	99.564			
29	.075	.248	99.812			
30	.056	.188	100.000			

Extraction Method: Principal Component Analysis.

Table 4: Factor Analysis

Rotated Component Matrixa						
Factors	Component					
	1	2	3	4	5	6
Mobility3	.826					
Mobility2	.810					
Mobility4	.802					
Usefulness3	.752					
Mobility1	.738					
Usefulness1	.648	.424				
Usefulness4	.640					
Usefulness2	.582					
Compatibility3	.556					
Compatibility2	.543					
Ease of use4		.869				
Ease of use1		.867				
Ease of use3		.860				
Ease of use2		.815				
Behavioral Intention3			.805			
Behavioral Intention4			.797			
Behavioral Intention1			.766			
Behavioral Intention2			.765			
Behavioral Intention5			.710			
Social influence4				.904		
Social influence3				.895		
Social influence1				.883		
Social influence2				.859		
Personal Innovativeness2					.798	
Personal Innovativeness3					.791	
Personal Innovativeness1					.770	
Personal Innovativeness4					.559	
Perceived Risk2						.899
Perceived Risk3						.894
Perceived Risk1						.795
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 6 iterations.						

Table 5: Factor Loading

Model	Standardized Coefficients	t	Sig.	Collinearity Statistics	
	Beta			Tolerance	VIF
(Constant)		-3.152	.002		
EoU	.100	2.187	.030	.595	1.681
USEFULNESS.MOB.COMP	.440	8.294	.000	.441	2.268
SI	.182	4.463	.000	.742	1.348
PI	.293	7.407	.000	.794	1.260
PR	-.007	-.190	.849	.973	1.028

Table 6 : Multiple Regression Analysis Results

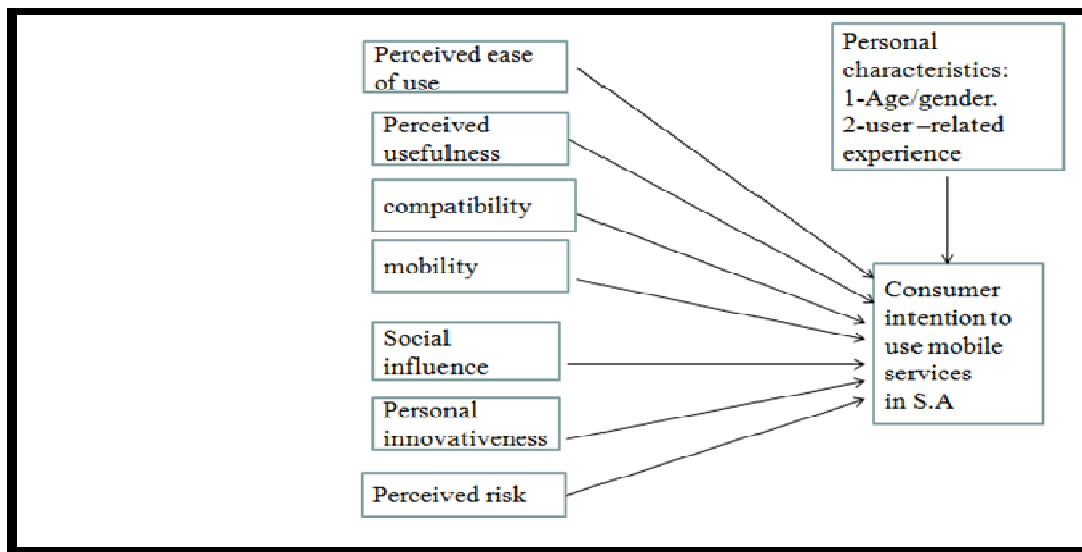


Figure 1 : Proposed Model

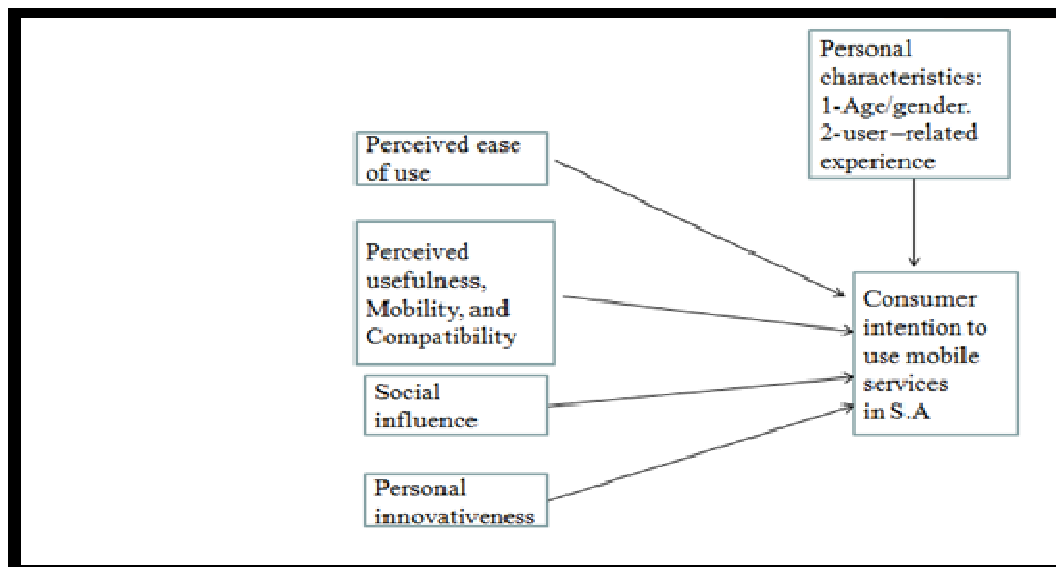


Figure 2: Revised Model Based on Regression Results & Factor Analysis (FA)

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