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## **A Modified Technology Acceptance Model for Camera Mobile Phone Adoption: Development and validation**

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### **Abstract**

*This study develops an extended Technology Acceptance Model (TAM) to assess the user acceptance and voluntary usage of the camera mobile phone technology. While there has been considerable research on the extension of TAM (Venkatesh and Davis 2000; Yi et al. 2006), limitations include the omission of an important privacy-based construct in the context of mobile devices. To fill in this gap, this study introduces a model that describes Camera Mobile Phone (CMP) adoption in the Arab world. Data collected from 241 users in Kuwait were tested against the extended TAM. Results reveal perceived enjoyment is the most direct determinant of CMP usage, followed second by personal innovativeness and third by perceived usefulness. However, results show privacy exerts the weakest effect on CMP usage.*

### **Keywords**

Mobile camera phone, TAM, individual difference, perceive usefulness, perceived enjoyment, perceive ease of use, personal innovativeness, social norm, and image.

### **INTRODUCTION**

The Mobile Phone industry is fast converging to offer new services such as internet, games, digital cameras capabilities, chatting and m-commerce. There is no doubt that mobile services industry is aware and understands what factors lead potential consumers to adopt such services. Among the available services, this paper seeks to understand the motivational factors to adopt the camera mobile phone (noted CMP) from an Arab perspective.

With the widespread of mobile phone services, a growing number of papers are dedicated to explore why people absorb such services. Our review of past literature showed that Technology Acceptance Model (TAM) has been tested and adopted across a wide range of IS/IT. The first category focused on non-communication forms of IT in the workplace. Most past studies focused on individual adoption of technologies in the workplace including adoption of PCs (Igarria et al. 1996; Anandarajan et al. 2002), word processing (Davis et al., 1989), Enterprise Resource Planning system (ERP) (Hwang 2005), telemedicine (Chau and Hu 2001), and other different office automated system (Venkatesh and Davis 2000). The second category focused on non-communication forms of IT for social purposes including Internet adoption in the Arab countries (Loch et al., 2003). The third category comprises new information and communications technology (ICT) usage in the workplace studies. It includes several technologies such as email (Davis 1989), instant messaging (Cameron and Webster 2005), internet usage (Lewis et al., 2003), groupware (Lou et al., 2000), blackboard system (Yi and Hwang 2003), mobile service for e-commerce (Lin et al., 2004). The fourth category focused on the usage of ICT for social purposes. It includes usage of instant messaging based-MSN (Li et al., 2005), usage of text messaging based mobile phone (Nysveen et al., 2005a,b), browser (Agarwal and Karahanna 2000), wireless mobile devices (Hung et al., 2003; Yi et al., 2006).

With regard to the above classification, we observed absence of studies pertaining camera mobile phone usage either in the workplace or for social purposes. In our reviewed process through well known conferences on information systems (ACIS, PCIS, ECIS, AMIS, ICIS, and HICSS), we observed scarcity of studies dedicated to CMP adoption. This study will contribute to fill in the gap by highlighting the usage of CMP for social purpose. In addition, per opposite to majority of previous studies, this paper will focus on current usage instead of intention to use. In addition, our literature review shows few past studies focused on current usage instead of intention to use (Igarria et al., 1996; Anandarajan et al., 2002; Hung et al. 2003; Yi and Hwang 2003).

Although there are some studies focusing on motives for using mobile devices and services, there are several unexplored dimensions related to our understanding of mobile services such as camera mobile phone usage. In trying to shed light on the issue, we will build our model based on the following three theories: Technology Application Model (TAM), the Theory of Reasoned Action (TRA), and the Innovation Diffusion Theory (IDT).

TAM assumes that beliefs (usefulness and ease of use) are the prime purpose behind using technology. TRA emphasizes that social pressure in the form of subjective norm is also an important factor influencing the behaviour. The IDT of Rogers (1983) claims that the characteristics of a new technology promote its acceptance. Image and personal innovativeness are two key constructs that are advocated by IDT. In TAM 2 Venkatesh and Davis (2000) included subjective norm, image, job relevance besides two other constructs (output quality and result demonstrability). Other studies have emphasized the role of enjoyment when the purpose is to explore usage of mobile device in the context of daily life. Uses and gratification research in the media, sociology, and social psychology are all different fields (Katz and Blumler 1974) that constitute the base for this construct.

Arab countries are characterised by high context culture and dominated by high attachment of people to religion and tribal traditions. In the Arab world, culture and social effects play a significant role in IT adoption. Previous studies have shown that Arab people use new ICT much for social and enjoyment purposes instead of work-related activities (Loch et al., 2003; Rouibah and Rouibah 2005). In seeking to understand the determinant of CMP usage in the Arab world, our study raises the following questions: Does the CMP adoption depend on the instrumental and cognitive complexity beliefs (usefulness and ease of use)? Does it depend on the social pressure (subjective norm and image)? Or does it depend on the gratification process (perceived enjoyment)? Does privacy play an important role in CMP adoption? This paper seeks to bring elements of response to these issues from an Arab perspective.

### Significance Of The Research

Over the last two decades a number of technologies have been the focus of many studies. However, to our knowledge, none of the studies in our literature review was dedicated to CMP adoption. In addition, no past study did integrate the privacy issues in technology acceptance. This study is therefore oriented to fill in the gap and contribute to orient the marketing and the industry efforts to enhance the comprehension pertaining to the requirements of potential adopters. In addition, the study is expected to study the suitability of exiting technology acceptance models to this new emerging technology. Finally, since ICT usage in the Arab world is almost unknown for non Arab researchers, this study will contribute to highlight the Arab behaviour with regard to the adoption of mobile services.

The remaining of the paper is structured as follow: Section 2 discusses the theoretical background for the model. Section 3 introduces the research model and hypotheses. Section 4 describes the research methodology. Section 5 presents the analysis and the results. The last section summarizes the main findings of the study and points out to managerial implications and future research directions

## CONCEPTUAL MODEL AND HYPOTHESES DEVELOPMENT

Based on the above discussion and the less lack of research on CMP, this research seeks to develop an extended TAM by including other constructs from the IDT and TRA. This study examines the relationship among the ten variables (figure 1). In addition, it focuses on current usage instead of intention to use.

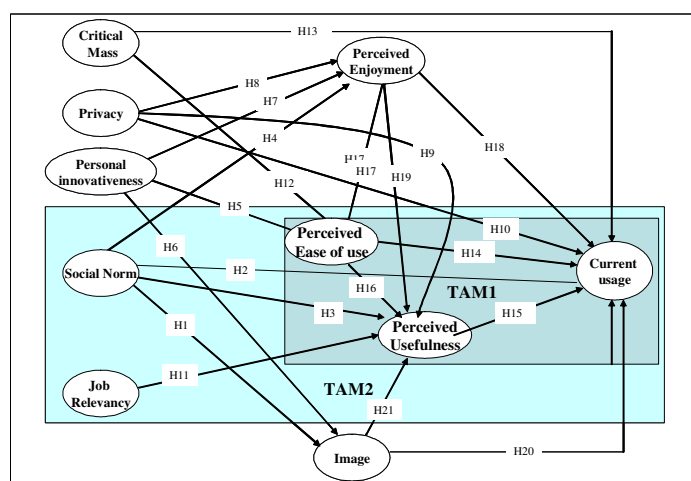


Figure 1. Research model

## External Variables

**Subjective norm:** It is derived from TRA as determinants of behavioural intention. Subjective norm refer to “*a persons’ perception that most people who are important to him think he should or should not perform the behaviour in question*” (Fishbein and Ajzen 1975). Through the direct effect of subjective norm, users may adopt a behaviour that complies with the group to whom they identify themselves. The direct compliance effect of subjective norm is the case when an individual perceives that a social actor wants him (her) to perform a specific behaviour, and the social actor has the ability to reward the behaviour or punish non-behaviour (Venkatesh and Davis 2000).

Past studies have found a direct effect of subjective norm on image (Venkatesh and Davis 2000; Yi et al., 2006), and on actual usage (Igbaria et al., 1996; Anandarajan et al., 2002). Other studies have failed to find such a relationship (Davis 1989). Yet, other studies have found that the subjective norm occupies the most important role in the internet usage in Egypt (Loch et al., 2003), and it is also considered to play the most important role on consumers' intention to use mobile services (Hung et al., 2003). In arguing our view, we follow Venkatesh and Davis (2000) who posit that subjective norm as an antecedent of image and current behaviour too. Other studies (Yi et al. 2006) found subjective norm an antecedent of Perceived Usefulness (PU). We therefore expect that *subjective norm will contribute* to raise the user's image in the society through CMP, will likely lead to more CMP usage and affect usefulness; this leads to the first three hypotheses:

**H1: Subjective norm will have a positive effect on image.**

**H2: Subjective norm will have a positive effect on CMP current usage.**

**H3: Subjective norm will have a positive effect on perceived usefulness (PU).**

In addition, we argue that people will perceive more enjoyment as they feel the new technology is used to overcome the *social and established norm* in the society (e.g. exchanging unethical pictures with both genders). For the first time we posit:

**H4: Subjective norm will have a positive effect on perceived enjoyment.**

**Personal innovativeness:** Several past studies have largely supported the notion that PU and Perceived Ease of Use (PEOU) fully mediate the influence of the individual difference variables on usage behaviour. Personal innovativeness is originated from the IDT. It refers to the risk-taking propensity that is higher in certain individuals who are more willing to take a risk by trying out an innovation than in others who are hesitant to change their practice. Agarwal and Prasad (1998) adapted this construct in the domain of IT and defined as the “*willingness of an individual to try out any new IT*”. Several past studies have investigated the effect of *personal innovativeness* on IT acceptance. Agarwal and Karahanna (2000) found that personal innovativeness influences indirectly PU, PEOU and intention to use. Lewis et al., (2003) found that personal innovativeness was a significant determinant of perceived ease of use, while Hung et al. (2003) found it is indirectly related to usage via the mediation of intention to use. Yi et al., (2006) found that personal innovativeness positively affects PEOU and subjective norm. In this paper we will not consider the effect of personal innovativeness on subjective norm as Yi et al. (2006) did, since we consider the subjective norm to be an independent external variables and image as a latent variable. We argue that the more a user shows signs of innovativeness, the more the individual perceives the technology as easy to use, and accordingly the more the technology enhances his/her image in the society and, therefore, the user enjoys its use. We posit the following hypotheses:

**H5: Personal innovativeness will have a positive effect on perceived ease of use.**

**H6: Personal innovativeness will have a positive effect on image.**

**H7: Personal innovativeness will have a positive effect on perceived enjoyment.**

**Perceived privacy:** Even though a considerable amount of studies where focused on trust in TAM, privacy was omitted in the context of mobile device, except few studies (Lin et al., 2003). In our model we focus on privacy instead of trust because taking and exchanging pictures in a conservative society makes the privacy a sensitive issue. Privacy concerns often arise when a new technology (e.g. CMP) enables enhanced capabilities for collection, storage, manipulation and dissemination of personal information. Issues related to privacy are increasing. For example Lin et al., (2003) examined the effect of privacy on e-commerce. They found that privacy is positively related to intention to be engaged in an e-commerce transaction.

In a collectivist culture like Arab societies more CMP guarantees privacy for potential users, more they will perceive its enjoyment, and likely they will use it for socialization purposes without fear of personal violation. For the first time this research hypothesizes that perceived privacy will affect enjoyment, PU, and current usage. Therefore, we claim the following hypotheses:

**H8: Perceived privacy will positively affect perceived enjoyment.**

**H9: Perceived privacy will positively affect perceived usefulness.**

**H10: Perceived privacy will positively affect CMP current usage.**

**Job relevance:** Based on TAM 2, Venkatesh and Davis (2000) theorized that job relevance exerts a direct effect on PU, and such effect is distinct from social influence process. The more a technology is capable of supporting a

wide set of tasks within one's job, the more it will be of high job relevance to a user. Venkatesh and Davis (2000) defined job relevance as “*an individual perception regarding the degree to which the target system is applicable to his or her job or task*”. Other authors used different concepts such as compatibility originated from IDT (Moore and Benbassat 1991; Chau and Hu 2001). Venkatesh and Davis (2000) included job relevance as an antecedent of PU, and found it to be strongly associated with PU. Chau and Hu (2001) found compatibility to be positively related to PU. Moore and Benbassat (1991) found that compatibility is a strong predictor or relative advantage (similar to PU). Consequently the following hypothesis is proposed:

**H11: Job relevance will positively affect perceived usefulness.**

**Perceived critical mass.** The defining feature of all ICT is that they require multiple users and it cannot be used successfully by one person acting alone. Thus, the success of an ICT is not only reliant on an individual's use of the technology, but also on others' responses towards this use. The theory of critical mass states that once a certain number of users (critical mass) have been attracted (or achieved), use should spread rapidly throughout the community (Cameron and Webster 2005). Theories in social psychology, economics, and diffusion of innovations directly or indirectly support the notion that perceived critical mass is a key variable for new IT acceptance (Lou et al, 2000). Potential adopters may get the impression that CMP is widely used within his/her group because many people are asking questions about it or a number of announcements were made about the technology. In turn, when a potential adopter asks questions about the technology, he/she may give others the perception that he/she is using the technology. Empirical findings showed that perceived critical mass is positively related to PEOU and intention to use (Lou et al., 2000), perceived enjoyment (Li et al., 2005), and indirectly in relation to intention to use (Li et al., 2005). In this paper we differentiate between subjective norm and perceived critical mass. We view subjective norm as the effect of culture (what should be or not be done by an individual) while the perceived critical mass refers to the effect of the group (friends) on users' decision. We argue that perceived critical mass affects PEOU and current usage. Hence, we state the following:

**H12: Perceived critical mass will positively related to perceived ease of use.**

**H13: Perceived critical mass will positively related to CMP current usage.**

### Mediating Variables

**Perceived usefulness (PU) and ease of use (PEOU):** TAM assumes that beliefs about PU and PEOU are always the primary determinants of current behaviour (Davis 1989; Venkatesh and Davis 2000; Agarwal and Karahanna 2000). PU refers to the extent to which a person believes that using a system would enhance his or her job performance, productivity and effectiveness. PEOU, on the other hand, refers to the extent to which a person believes that using a system will be free of mental effort. There is extensive empirical evidence accumulated over a decade that examined the effect of PEOU and PU on current usage (instead of intention to use). They found a positive effect of PEOU on current usage (Davis 1989; Igbaria et al., 1996; Anandarajan et al., 2002; Hung et al., 2003), and a positive effect of PU on current usage (Davis et al, 1989; Davis 1989; Igbaria et al., 1996; Anandarajan et al., 2002).

One of the important aspects of camera phones is the digital nature of the medium. This is important due to the fact that images captured in this format can be effortlessly copied and distributed. Using the mobile phone networks or the internet, captured images can easily be distributed to a large number of people in a tiny time period. While digital cameras eliminate film, CMP go much further and increases the distribution of captured images. Thus more a user perceives usefulness and ease of use of CMP, more his/her usage frequency will become. Therefore we posit:

**H14: PEOU will positively influence CMP current usage.**

**P15: PU will positively influence CMP current usage.**

Most past studies about TAM assume also that PEOU is directly linked to PU (Davis 1989; Davis et al., 2002; Anandarajan et al., 2002; Nysveen et al., 2005ab), while other studies have shown that PEOU also affects enjoyment (Lou et al., 2000; Anandarajan et al., 2002; Nysveen et al., 2005ab). In this regard, more a user perceives CMP ease of use better enjoyment and usefulness that is derived will be. Thus, we propose the following two hypotheses:

**H16: PEOU will positively influence perceived usefulness.**

**H17: PEOU will positively influence perceived enjoyment.**

**Perceived enjoyment:** It is defined as “*the extent to which the activity of using the new technology is perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated*” (Davis et al. 1989). Individuals, who experience immediate pleasure and joy from using the new technology apart from any anticipated performance, are likely to use it more extensively than others. Davis et al. (1989) found that while PU emerged as the major determinant of computer acceptance in the workplace, enjoyment and fun had a significant effect beyond PU. Several recent studies found that perceived enjoyment has direct effect on behavioural usage in the following situation: IT in the workplace (Igbaria et al., 1996; Hwang 2005), use of instant messaging (Li et al.,

2005) and intention to use mobile device (Nysveen et al. 2005a, 2005b). Moreover, several recent studies (Yi and Hwang 2003; Li et al., 2005; Nysveveen et al., 2005b) found that perceived enjoyment exerts stronger direct effect on intention to use than does PU. CMP is different than IT in the workplace where PU is the most driving usage factor (Lou et al. 2000; Davis et al., 1989). Since CMP has a hedonic component, we argue that perceived enjoyment will affect current usage behaviour. The rational behind is that more a user perceives enjoyment in CMP likely he will use and continue to use it, thus leading to the following hypothesis:

**H18: Perceived enjoyment will positively influence CMP current usage.**

Empirical studies have also found that perceived enjoyment has direct effect on PU (Yi and Hwang 2003; Hwang 2005), which lead to the next hypothesis

**H19: Perceived enjoyment will positively influence perceived usefulness.**

**Image:** This construct is derived from the IDT. Image refers to the extent to which use of an innovation is perceived as enhancement of one's status in a social system (Moore and Benbasat 1991). Later on Venkatesh and Davis (2000) expanded social influences to include image in TAM 2. They posit image as an antecedent of PU, and subjective norm as an antecedent of image. Image was found to strongly mediate the effect of subjective norm on user acceptance of new IT. Following the argument of Venkatesh and Davis (2000), image is the result of the direct compliance effect of subjective norm. When using a CMP in front of another person, not only usefulness and ease of use are important, but a sense of social image is considered to be critical for many. Several cases are reported in previous literature. For example Lu et al. (2003) reported that in Japan, young people consider new generation of mobile phone as new fashion items to show off in public. Nysveen et al. (2005a, 2005b) found expressiveness (considered similar to image by the authors) has direct effect on intentions to use mobile services. In addition Nysveen et al., (2005b) found that perceived expressiveness exerts the third influence on intention to use after enjoyment and PU. In a high context and social culture, increased status within the group is a basis of power and influence via group resources, and new technologies such as CMP. We argue that the desire to gain social status is an important motivational factor toward CMP usage in the Arab world.

**H20: Image will have a positive effect on CMP current usage.**

Previous studies have also found that image is positively related to PU, which in turn mediates indirectly the effect of image on behaviour (Venkatesh and Davis 2000; Yi et al., 2006). Thus we posit the last hypothesis.

**H21: Image will have a positive effect on perceived usefulness.**

## RESEARCH METHODOLOGY

### Subjects and Procedure

Instrument design follows a process of three steps. First, brainstorming session was held with 60 students to highlight causes and consequences of CMP usage. Second, a literature review of existing models about IT adoption was conducted, and an instrument was developed and checked by two faculty members. Third, a pilot phase was carried. It involved a sample of 33 people in order to examine the questionnaire for validity (measuring what is intended), completeness (including all relevant variable items), and readability/understandability. The lessons learned from the pilot suggested some changes with respect to the instrument. In particular two constructs from TAM2 (result demonstrability and output quality) were not important in CMP adoption; accordingly they were dropped from the study. These changes were incorporated in this study. In addition, the authors examined language translation to ensure that the interpretation of questionnaires (used in the pilot study in English as well as in Arabic) had the same linguistic interpretations for all subjects. Afterward 270 questionnaires were distributed at a leading college of business administration at Kuwait University. The survey consisted of 35 questions, each representing component of the research model; and 3 representing demographic data. Questionnaires were circulated to students and solicited their beliefs and attitudes regarding the use of CMP. Selected subjects were students enrolled in the course "Introduction to management information systems", after they had been introduced to M-commerce subject. We have chosen students because it is a convenient sample that would be appropriate to test the acceptance and adoption of a new technology where subjective norm plays an important role in its adoption. Students were administered the questionnaire upon completion of a chapter dedicated to e-commerce and m-commerce. Students were first initiated to services of m-commerce and then a discussion of potential application of CMP to support m-commerce was follow.

Among the 270, only 240 questionnaires were fully completed. 66.8% of the respondents were male students. The majority of respondents are young since their ages range from 18 to 25, and 94.2% were married. With regard to CMP usage, 68.5% use their CMP to transfer their pictures to other media storage, 67.2% used it to listen and watch video clips, and 66% shared pictures with their family members and bubbles. In addition, 48% used their CMP for ecommerce, i.e. to get the opinion of their partners before shopping.

### Constructs measurement

All the constructs in the research model (except current usage and perceived privacy) were operationalized using standard scales from past literature. Perceived usefulness was measured with 9 items: 5 adopted from Li et al. (2005) and 4 new items from Davis (1989). PEOU was measured with four of Davis's original scales (Davis 1989). Perceived enjoyment (PE) was measured with three of Igbaria et al. (1996) items as well as an additional item to fit the culture where CMP is used. Subjective norm (SN) was measured with three items, two were adapted from Taylor and Todd (1995), and a new one was added to fit the context of the CMP study. Image was measured according to the three items of Moore and Benbasat (1991). Job relevance (JR) was measured using the three items used by Venkatesh and Davis (2000). Personal innovativeness (PI) was measured by three items of Agarwal and Prasad (1998). Perceived critical mass (PCM) was measured using four items of Li et al., (2005). We have measured Perceived privacy using two new items derived from studies on information privacy: "*CMP is used to violate men's information privacy (Priv1)*"; "*CMP is used to violate women's information privacy (Priv2)*". Each item in the above constructs was evaluated on five-point semantic differential scales. Individuals were asked to rate the items according to how they feel about using a CMP and to check off items that best describe their opinion and feeling. Since this is the first study on CMP, current usage was operationalized using self report measures. Respondents were asked to indicate what kind pictures they often take. A list of 14 items was given and respondents were asked to select those that usually take including: Family, friends, famous persons, for self picturing, fashion design, decoration, recent models, hairstyle, house design, clothes, strange events, funny and beautiful pictures, crime proofs, and urgency events.

### Measurement and Structural Model Methods

Analysis of data from 240 samples was conducted through two stages. The measurement model is tested first, followed by the testing of the structural model. Factor analysis based on Varimax rotation was specified to identify variables that might indicate potential constructs, and factor loading were examined at 0.50 and above on each potential construct with *eigenvalues* greater than one were retained to validate the model (e.g. Hair et al., 1998).

To test hypotheses (H1-H21), a structural model was evaluated. If a model fits the data adequately, the t-values of the structural coefficients (i.e. gamma and beta) can be used to test the research model.

The overall fit of the hypothesized model can be assessed using several fit indices: Chi-square/df $\leq$ 3; CFI $\geq$ 0.90; NNFI $\geq$ 0.90; RMSEA $\leq$ 0.08; GFI $\geq$ 0.80 and AGFI $\geq$ 0.80. Besides overall fit model, convergent and discriminant validity were also examined.

## MEASUREMENT AND STRUCTURAL MODEL RESULTS

### Measurement model

The analysis showed eleven factors instead of original ten. These factors explained 72% of the variance in the instrument. Current usage was split into two distinct factors. The first one is related to social interaction with people that we name "*social use*" while the second one is related to CMP usage before shopping (before transaction). We name this construct as "*business use*".

The factor validation process described above met the base criteria for retention (Hair et al., 1998): Items defining the various factors all had communalities greater than 0.50; All factors had Eigen-values greater than 1.0; and all item loadings were greater than 0.50.

Table 1 provides goodness of fit statistics of the model which shows an acceptable model-data fit. The posited measurement model appears to be supported by various fit indices which are within the acceptable range. In addition table 1 provides composite reliabilities, average variance extracted (AVE), correlations and square correlation among the constructs. The reported values provide evidence of convergent and discriminant validity since all composite reliabilities and AVE are well above the recommended level of 0.50 that Hair et al., (1998) suggested. We find also that all variables share more variance with their indicators than with the other variables in the study. Evidence of discriminant validity is provided by comparing the squared correlation of two constructs against their individual AVE.

	PCM	PI	SN	Privacy	JR	PU	Image	PEOU	PE	Social use	Business use
<b>PCM</b>	.88 <sup>a</sup> .70 <sup>b</sup>										
<b>PI</b>	0.43 <sup>c</sup> 0.18 <sup>d</sup>	.86 .67									
<b>SN</b>	0.33 0.10	0.42 0.17	.75 .52								
<b>Privacy</b>	0.27 0.07	0.05 0	0.00 0	.64 .52							
<b>JR</b>	0.11 0.01	0.43 0.18	0.53 0.28	0.11 0.01	.86 .68						
<b>PU</b>	0.19 0.04	0.47 0.22	0.51 0.26	0.19 0.04	0.55 0.30	.90 .60					
<b>Image</b>	0.08 0.00	0.33 0.11	0.43 0.18	0.00 0	0.39 0.15	0.41 0.17	.89 .74		-		
<b>PEOU</b>	0.41 0.17	0.42 0.18	0.22 0.05	0.09 0	0.16 0.03	0.34 0.12	0.12 0.01	.90 .75			
<b>PE</b>	0.34 0.16	0.65 0.42	0.46 0.21	0.18 0.03	0.38 0.15	0.52 0.27	0.28 0.08	0.29 0.08	.82 .61		
<b>USA1</b>	0.41 0.17	0.42 0.18	0.30 0.09	0.14 0.02	0.21 0.05	0.32 0.10	0.20 0.04	0.39 0.15	0.49 0.24	.70 .51	
<b>USA2</b>	0.17 0.03	0.29 0.08	0.25 0.06	0.12 0.01	0.22 0.05	0.36 0.13	0.11 0.01	0.06 0	0.45 0.20	0.21 0.05	.86 .67

<sup>a</sup>Composite reliabilities are on the diagonal; <sup>b</sup>Average variance extracted are on the diagonal; <sup>c</sup>Correlation; <sup>d</sup>Square correlation

$Composite\ reliability = \frac{\text{Sum of standardized loading}^2}{(\text{Sum of standardized loading}^2 + \text{Sum of indicator measurement error})} = \frac{(\sum \lambda_i)^2}{[(\sum \lambda_i)^2 + \sum |\delta_i|]}$

$AVE = \frac{\text{Sum of squared standardized loadings}}{(\text{sum of squared standardized loadings} + \text{Sum of indicator measurement error})} = \frac{(\sum \lambda_i^2)}{(\sum \lambda_i^2 + \sum |\delta_i|)}$

**Table 1. Correlation, composite reliabilities, and discriminant validity of the structured model**

### Testing the Overall Structural Model

In order to determine which of the ten variables are interrelated, the structural equation modelling software LISREL has been used in conjunction of SPSS. It enables to examine the significance of each hypothesized path between constructs in the research model. As well as the variance explained (R<sup>2</sup> value) by each path of the hypothesized 21 paths. Results indicate that 15 hypotheses are found to be significant at p < 0.01 level with t-value greater than 1.94 (Hair et al., 1998). Table 2 displays the direct, indirect and total effect between constructs of the model.

**Predicting CMP current usage:** The variance of the *social use* explained is 32% and 24% in the *business use*, which are acceptable. Three constructs directly affect *social use*: perceived critical mass ( $\alpha = 0.20$ ; p < 0.01), perceived enjoyment ( $\beta = 0.34$ ; p < 0.01) and PEOU ( $\beta = 0.20$ ; p < 0.01). Among the three variables, perceived enjoyment exerts the strongest direct effect. Moreover, two constructs affect directly *business use*: Perceived enjoyment ( $\beta = 0.36$ ; p < 0.01) and PU ( $\beta = 0.24$ ; p < 0.01). However, perceived enjoyment exerts the strongest direct effect. Results also reveal that perceived enjoyment, ease of use and usefulness mediate the effect of external variable on current usage. In addition, only three external variables exert an indirect effect on *social use*. These are: perceived privacy ( $\alpha = 0.06$ ; p < 0.01), personal innovativeness ( $\alpha = 0.26$ ; p < 0.01), and social norm ( $\alpha = 0.10$ ; p < 0.01). The same three variables exert also an indirect effect on *business use* through PEOU and enjoyment: Perceived privacy ( $\alpha = 0.10$ ; p < 0.01), personal innovativeness ( $\alpha = 0.20$ ; p < 0.01), and social norm ( $\alpha = 0.13$ ; p < 0.01). Personal innovativeness exerts the most indirect effect both on *social use* and *business use*, followed by social norm. Results also reveal that PE exerts the strongest total effect followed by personal innovativeness.



	6-Image	7-PEOU	8-PE	9-PU	10-Social use	11-Business use
1-PCM		<b>H12</b> .29 <sup>a</sup> (3.88) _b .29 <sup>c</sup> (3.88)			<b>H13</b> .20 <sup>a</sup> (2.38) .05 <sup>b</sup> (1.16) .24 <sup>c</sup> (2.94)	H13 -.07 <sup>a</sup> (-0.91) -.06 <sup>b</sup> (-1.34) .01 <sup>c</sup> (0.17)
2-PI	<b>H6</b> .19 <sup>a</sup> (2.28) _b .19 <sup>c</sup> (2.28)	<b>H5</b> .29 <sup>a</sup> (3.93) _b .29 <sup>c</sup> (3.93)	<b>H7</b> .54 <sup>a</sup> (6.45) _b .54 <sup>c</sup> (6.45)	- .05 <sup>a</sup> (0.56) .21 <sup>b</sup> (3.54) .26 <sup>c</sup> (3.23)	- _a .26 <sup>b</sup> (4.78) .26 <sup>c</sup> (4.78)	- _a .20 <sup>b</sup> (3.65) .26 <sup>c</sup> (4.78)
3-SN	<b>H1</b> .30 <sup>a</sup> (3.38) _b .30 <sup>c</sup> (3.38)		<b>H4</b> .24 <sup>a</sup> (3.42) _b .24 <sup>c</sup> (3.42)	<b>H3</b> .19 <sup>a</sup> (2.27) .09 <sup>b</sup> (2.79) .29 <sup>c</sup> (3.42)	<b>H2</b> _a .10 <sup>b</sup> (2.93) .10 <sup>c</sup> (2.93)	H2 _a .13 <sup>b</sup> (3.13) .13 <sup>c</sup> (3.13)
4-Privacy			<b>H8</b> .16 <sup>a</sup> (2.25) _b .16 <sup>c</sup> (2.25)	<b>H9</b> .13 <sup>a</sup> (1.86) .04 <sup>b</sup> (1.83) .17 <sup>c</sup> (2.33)	<b>H10</b> _a .06 <sup>b</sup> (1.98) .06 <sup>c</sup> (1.98)	H10 _a .10 <sup>b</sup> (2.65) .10 <sup>c</sup> (2.65)
5-JR				<b>H11</b> .25 <sup>a</sup> (3.16) .02 <sup>b</sup> (1.41) .28 <sup>c</sup> (3.38)	- _a .01 <sup>b</sup> (0.56) .01 <sup>c</sup> (0.56)	- _a .05 <sup>b</sup> (1.83) .05 <sup>c</sup> (1.83)
6- Image				<b>H21</b> .14 <sup>a</sup> (2.17) _b .14 <sup>a</sup> (2.17)	H20 .06 <sup>a</sup> (0.80) .00 <sup>b</sup> (0.16) .06 <sup>c</sup> (0.87)	H20 -.08 <sup>a</sup> (-1.12) .05 <sup>b</sup> (2.11) -.05 <sup>c</sup> (-0.68)
7- PEOU				<b>H16</b> .20 <sup>a</sup> (3.12) _b .20 <sup>c</sup> (3.12)	<b>H14</b> .20 <sup>a</sup> (2.48) .00 <sup>b</sup> (0.16) .21 <sup>c</sup> (2.60)	H14 -.14 <sup>a</sup> (-1.85) _b -.09 <sup>c</sup> (-1.25)
8- PE				<b>H19</b> .22 <sup>a</sup> (2.68) _b .22 <sup>c</sup> (2.68)	<b>H18</b> .34 <sup>a</sup> (3.69) .00 <sup>b</sup> (0.16) .34 <sup>c</sup> (4.00)	H18 .36 <sup>a</sup> (4.03) .05 <sup>b</sup> (2.00) .41 <sup>c</sup> (4.75)
9-PU					H15 .01 <sup>a</sup> (0.16) _b .01 <sup>c</sup> (0.16)	<b>H15</b> .24 <sup>a</sup> (2.71) _b .24 <sup>b</sup> (2.71)
Model fit: $\chi^2=1654$ (p=0.00); 591 df; $\chi^2/df=2.8$ ; CFI=0.91; NFI=0.90; NNFI=0.90; Standardized RMR=0.06; RMSEA=0.07; GFI=0.88; AGFI=.84						
<sup>a</sup> Direct effect; <sup>b</sup> Indirect effect; <sup>c</sup> Total effect						

**Table 2. Summary table of structural model with standardized coefficients**

**Predicting of PU:** Variance in PU of CMP was totally explained in 50% by five constructs: Perceived enjoyment ( $\beta= 0.22$ ;  $p < 0.01$ ), PEOU ( $\beta= 0.20$ ;  $p < 0.01$ ), image ( $\beta= 0.14$ ;  $p < 0.01$ ), social norm ( $\beta= 0.19$ ;  $p < 0.01$ ), and job relevance ( $\beta= 0.25$ ;  $p < 0.01$ ). Among these constructs, job relevance exerts the strongest effect, followed by perceived enjoyment (second effect), and PEOU (third effect). In addition, two external variables exert an indirect effect: subjective norm ( $\alpha = 0.09$ ;  $p < 0.01$ ), and personal innovativeness ( $\alpha = 0.21$ ;  $p < 0.01$ ). But personal innovativeness exerts the strongest indirect effect on PU. With regard to the total effect on PU, subjective norm exerts the strongest effect ( $\alpha = 0.29$ ;  $p < 0.01$ ) followed by job relevance ( $\alpha = 0.28$ ;  $p < 0.01$ ).

**Predicting perceived enjoyment:** Three external constructs contribute directly to explain 48% in the variance of perceived enjoyment: Privacy ( $\alpha = 0.16$ ;  $p < 0.01$ ), personal innovativeness ( $\alpha = 0.54$ ;  $p < 0.01$ ), and subjective norm ( $\alpha = 0.24$ ;  $p < 0.01$ ). Among these variables, personal innovativeness exerts the strongest direct effect, followed by subjective norm.

**Predicting image.** Two external variables contribute to affect directly the image construct and explain 24% in its variance: Personal innovativeness ( $\alpha = 0.19$ ;  $p < 0.01$ ), and subjective norm ( $\alpha = 0.30$ ;  $p < 0.01$ ). However, the effect of subjective norm is stronger than that of personal innovativeness.

**Predicting of PEOU:** Two external constructs directly affect PEOU: perceived critical mass ( $\alpha = 0.29$ ;  $p < 0.01$ ) and personal innovativeness ( $\alpha = 0.29$ ;  $p < 0.01$ ). However, the two constructs exert equal effect on PEOU and contribute to explain 24 % in the total variance of PEOU.

Table 3 shows the summary findings of CM adoption in Kuwait

Hypotheses	Critical path	Findings: Supported vs. not supported
H1: SN--image.	0.30	Yes
H2: SN--Usage.	-	No
H3: SN-- PU.	0.19	Yes
H4: SN--PE.	0.24	Yes
H5: PI -- PEOU.	0.29	Yes
H6: PI--Image	0.19	Yes
H7: PI--PE	0.54	Yes
H8: Privacy --PE	0.16	Yes
H9: Privacy--PU	-	No
H10: Privacy--Usage	-	No
H11: JR--PU	0.25	Yes
H12: PCM-- PEOU	0.29	Yes
H13: PCM--Usage	Social use (0.20) Business use (No)	Partially
H14: PEOU--Usage	Social use (0.20) Business use (No)	Partially
P15: PU--Usage	Social use (No) Business use (0.24)	Partially
H16: PEOU--PU	0.20	Yes
H17: PEOU--PE	-	No
H18: PE--Usage	Social use (0.34) Business use (0.36)	Yes
H19: PE--PU	0.22	Yes
H20: Image-Usage	-	No
H21: Image--PU	0.14	Yes

Table 3. Summary findings

## DISCUSSION AND CONCLSION

The study focused on the voluntary usage of camera mobile phone in a collectivist culture (Arab world). This paper makes several contributions in the field of information system and information technology. The major contributions stem from (a) shedding light on what makes CMP interesting and enjoyable in the Arab culture; (b) the application of a rigorous statistical technique - the application of structural equation modelling using LISREL; (c) the extension of TAM to include the new privacy construct. The most important result is that the study revealed two types of CMP usage: one for *social use* and another for *business use*; each usage has its own specific determinants. It also revealed that perceived enjoyment plays the most determinant on current usage. Such result is not unique to CMP since previous studies conducted in the Arab world have also shown same result in the case of instant messaging usage (Rouibah and Rouibah 2005). In addition, while the study introduces privacy for the first time in TAM, results reveal it has the weakest effect on perceived enjoyment, PU (before image), and current usage (social and business usage). Findings of the paper extend the traditional TAM models in several ways. *First* it provides an external validity of the TAM to a new technology and to another culture (Arab culture) that has not been investigated before. *Second*, the extension included mainly two constructs: privacy and enjoyment. A *third* contribution is that the paper emphasizes that technology usage in the Arab world is largely explained by enjoyment and individual characteristics in term of personal innovativeness dimensions. *Fourth*, the study has shown that perceived enjoyment exerts more influence on CMP usage than does PU, PEOU, and subjective norm. *Fifth*, this paper closes a research gap as the model tested provides insights toward understanding the consumer-based phenomenon of CMP, and serves to evaluate the TAM in this context. In contrast to previous research the study utilized an actual measure of mobile adoption instead of a measure for intention to use.

Our findings support and contrast previous results on TAM 1 (Davis 1989). Our findings show that PU exerts more effect than PEOU which is in line with previous studies. Among the external and latent variables, perceived enjoyment exerts more effect on current usage than PU, PEOU and subjective norm. This findings contrast with TAM 1 (Davis et al., 1989, Hwang 2005) where PU emerged as the major determinant of IT acceptance in the workplace. But our findings support findings of recent studies on ICT in the workplace (Yi and Hwang 2003) and

ICT for social use (Nysveen et al., 2005a,b) which found that perceived enjoyment is the major determinant of behavioural intention. Therefore we can infer that perceived enjoyment is the most determinant of ICT for social purposes.

Our findings support and contrast with TAM2, in that subjective norm effects image and image effects PU. With regard to the direct effect of subjective norm on current usage, our study failed to prove such a link as was found in TAM 2 (Venkatesh and Davis 2000) who tested TAM2 on IT the workplace (in USA) and the integrated model (Yi et al., 2006) tested on ICT for social purpose (in USA). However, our study reveals the existence of an indirect effect through the mediation of PU. In addition, this study contrasts with TAM2 and integrated model since it reveals that perceived enjoyment and personal innovativeness exerts the most important role on CMP usage, and more than PU. We can advocate one possible explanation: individualism/ collectivist of Hofstede (1980). Individualist culture promote usefulness while collectivism culture advocate enjoyment

Our study also contrasts findings of previous studies in less developed countries (in Africa). In particular it contrasts with Anandarajan et al. (2002) who found that PU and perceived enjoyment have no direct effect on computer usage, while PEOU and subjective norm have a strong direct effect on system usage. They found also that subjective norm exerts the strongest effect on current usage. Results are different because of two criteria: type of used technology (IT/ICT) and setting (workplace vs. social purpose). While Anandarajan et al. (2002) focused on IT in the workplace our study focused on ICT for social purpose.

The above findings should be interpreted in light on the following: (a) The focus of the paper is concentrated on CMP current usage outside the workplace instead of intention to use; (b) The used technology is an ICT that has a hedonic (enjoyment) component instead of IT, and (c) the respondents are students.

The findings of this study contribute to a better theoretical understanding of the factors that promote ICT adoption in the Arab world.

In addition the study has several implications for theory and practice. From a practical perspective, results of the study could be used to promote m-commerce before shopping. From a research perspective there is a need to extend the external validity of the model to employee's usage for social use and in the workplace. While students base their behavioural decision on enjoyment and innovativeness and ease of use, employees may focus more on perceived usefulness or other concrete, specific criteria. Such hypothesis requires additional studies and support in the workplace. A comparison between usage in the workplace and social purpose for both student and employees could shed more light on factors affecting CMP usage.

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