Exploring the extension of unified theory of acceptance and use of technology, UTAUT2, factors effect on perceived usefulness and ease of use on mobile commerce in Egypt

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Convenience, Social influence, Hedonic motivations, perceived usefulness, ease of use

Abstract

This paper aims to study the factors that enhance users of mobile commerce perception, in order to promote such form of online shopping in Egypt. Researchers explored the factors affecting users of Mobile communication and electronic shopping by identifying all factors considered in all technology user's behavior theories. Then through an exploratory research, those factors were examined to know the most relevant for mobile commerce and also, the reliable and valid measures for considering its effect on the user's perception of its usefulness and ease of use. Three factors were considered of the highest importance, social influence, convenience and hedonic motivations. Such factors were tested and they all had a significant effect. Also, their effect on each other were tested. Thus, through such analysis, the researchers realized in Mobile commerce, that Social influence were fully mediated with hedonic motivation and convenience. The effect of Convenience tend to be one of the most affecting for perceptions of consumers of usefulness and ease of use also, it has a strong mediation effect between social influence and mobile commerce user's perceptions.

Introduction

Worldwide, expansion of electronic commerce and the surge of mobile commerce developed new opportunities and markets for businesses. According to global Retail survey (PWC, 2015), 47% of global consumers used mobile device to make a purchase during 2014 compared to 30% two years ago, which implies that there is a rapid growth in mobile device usage as a means of conducting online shopping. Moreover, 62% of global users compared to 75% in the Middle East consumers believe that purchases are more likely through social media. In Middle East, Egypt has the largest population for online buyers, 15.2%. However, due to the low purchasing power and other conditions such as security concerns for payments, the United Arab Emirates and Kuwait have more online buyers for e-commerce (Daily News, May 2015). In UAE, 46% of total internet users are online consumers. On the other hand, in Egypt, which has a highest number of internet users 55%, only 8% of total internet users are online consumers. Moreover, as of mobile internet users, they constitute only 22% of mobile subscribers who are almost 95 million. (Payfort, April 2015). Consequently, although there is a huge potential in this market for M-commerce, there is still a very limited usage for such technology which possess lots of questions for the reasons underlying.

In order to understand the term mobile commerce, the term split into "Mobile" and "commerce". Mobile means "Anywhere and Anytime access". This access takes place through mobile communications networks, which facilitates this access regardless of geographic location (Hohenbery and Rufera, 2004). M-Commerce is defined as "buying and selling of goods and services, using wireless hand-held devices such as mobile telephones or personal data assistants" (UNCTAD, 2002), or conducting transactions using communication networks (Muller-veerse, 2000). In comparing the terms

"Mobile "and "Wireless", mobile device is a wireless connection, however, not all wireless devices are mobile applications (Ancher and Dincau, 2002). So, we can consider mobile commerce as part of the electronic commerce evolutions and lots of the theories governing e-commerce can be explored for M-commerce to explain consumer behavior for such technology. Theories as TAM (Technology Acceptance Model) and TPB (Theory of planned Behavior and later the extension of TAM2 then lately, UTAUT and UTAUT2 are known theories for explaining consumer behavior in using technologies and electronic commerce. Researchers aim to study factors in these theories and their effect on Mobile commerce in Egypt.

Theoretical frame work

Theories as TAM (Technology Acceptance Model) and TPB (Theory of planned Behavior and later the extension of TAM2 are known theories for explaining consumer behavior in using technologies and electronic commerce. The theory of planned Behavior (TPB) is an evolution from TRA. TRA included variables such as experience, a person's demographic characteristics or personality traits. Such variables didn't have a direct effect on behavioral performance. As a result, other components of TPB mediated the effect of such variables. Ajzen (1991) expressed those other components as availability or requisite opportunities and resources which led to the development of the construct of perceived control. Ajzen (1988) refers to perceived control as the level of difficulty of performing a behavior. He also hypothesized a relationship between perceived control and buying intentions. This theory posits that the intention to a behavior is usually the immediate driver of actual implementation of such behavior (Ajzen, 2002). A behavioral intention is the willingness or the motivation of a person to commit effort and time to a certain behavior (Courneya et al., 1999). Intention is determined by three variables; attitudes, subjective norms, and perceived behavior control. These evolutions led to the development of the technology acceptance model. Thus, TRA and TPB is an antecedent of TAM (Technology acceptance model). The technology acceptance model was initiated for accessing user acceptance of information systems and factors affecting. Its goal was to define the determinants of computer acceptance and explain end-user acceptance among different computing technologies, through a theoretically verified theory (Davis, et al, 1995). It emphasis a person's behavior towards technology through his behavioral intentions, which is determined through his attitudes and beliefs toward technology. TAM suggest that the usage of Information systems is determined by user behavioral intentions which is determined by his perceived usefulness and attitudes towards technology which is determined by both perceived usefulness and perceived ease of use. The TAM has limitations as it doesn't include separate normative constructs, the facilitating conditions component of perceived control, affective beliefs and measures of Habit. The TAM model was further extended by Vanketesh and Davis, (2000)) by incorporating social and organizational variables, such as Subjective norms , image, job relevance, output quality, and result demonstrability, into the original TAM model.

The Unified theory of acceptance and use of technology (UTAUT) developed as an extension for TAM and TAM2 models (Venkatesh et al, 2003). In this model, there are four key constructs that affect behavioral intentions to use technology. Such constructs are performance expectancy, effort expectancy, social influence, and facilitating conditions. Performance expectancy is the degree to which it is beneficial to consumers in performing certain activities. Effort expectancy represents the degree of ease of use of technology. Social influence is the extent to which consumers perceive the important others believe they should use a particular technology, finally facilitating conditions which refers to consumers 'perceptions of the resources and support available to perform behavior (Brown and Venkatesh, 2005; Venkatesh et al., 2003), while considering age, gender and experience as moderating the relationship between the four constructs and behavioral intentions. Complementary to UTAUT, Hedonic motivation, price value, experience and habits were added to the four constructs to extend the model to UTAUT2 (Venkatesh et al., 2012). Hedonic motivation has been used in much consumer behavior research (Holbrook and Hirchman, 1982). Hedonic motivation is defined as fun or pleasure

derived from using technology also hedonic hedonic motivation has been conceptualized as perceived enjoyment (Van der Heijden, 2004; Thong et al, 2006). Price value was also integrated as the extent where benefits of using technology are greater or less than the cost of using it, and finally experience and habit reflects an opportunity to use a target technology and is typically operationalized as the passage of time (Venkatesh et al., 2003), while habit is the instrumental behavior resulted from learning (Linayem et al., 2004)

In this paper, researchers conducted exploratory research with Mobile commerce consumers and experts to emphasis on the variables that would enhance Mobile shopping users' adoption they explored all variables as dependent and independent variables hypothesized in TAM and UTUAT2 models. The result emphasized on the importance of perceived usefulness and ease of use as determinants for mobile commerce usage in Egypt. Furthermore, convenience, hedonic motivations, and social influence have a crucial effect on Mobile commerce.

Perceived usefulness and Ease of use (EOU_PU)

Perceived usefulness (PU) is defined as the perceived advantage in performing any task while using a system. While perceived ease of use (PEOU) is defined as the usage of a system with minimum or no effort. Perceived usefulness included relative advantage and compatibility. Relative advantages are several factors, cognitive and decisional control, enhanced privacy, improved security, and information access. Compatibility is fitting between individual usage ad individual lifestyles and the ability of the system to fulfill personal situational needs (Keeling 1999). As of Davis et al. (1992), Perceived usefulness is considered as primary factor for predicting behavior intentions while perceived ease of use is considered secondary. The importance of such variables is determined by the characteristics of IT itself used (Gefen and Straub, 2000). Also, ease of use importance varied in a study on MBA students about their usage of booksellers of e-books, however, it wasn't that important in the purchases. Moreover, there is empirical support provided for the relationship between usefulness and attitudes by a number of studies. On exploring the impact of Perceived ease of use on Usefulness, Systems that are harder to use impact usefulness negatively, therefore the less EOU the less is usefulness. Hence there is a direct effect of PEOU on usefulness. Also, there is an indirect positive effect of Perceived ease of use on attitudes through perceived usefulness (Davis, 1986, 1989). However, in a recent study on online shopping in Korea (Wang, 2011), PU shows lower importance in affecting attitudes, while PEOU is getting to be a basic requirement. In, Wu and Ke (2015), meta-analysis, PEOU had a direct effect on online shopping intentions without any mediation. On the other hand, in a study conducted in Jordan (Faqih, 2011), PEOU tend to affect online purchasing intentions indirectly through perceived usefulness. Finally, in a study conducted in India on urban citizens' online shopping intentions, PEOU did have a direct effect on online shopping intentions than PU (Sirinvasan, 2015).

Hedonic motivations (HM)

Hedonic motivation is the pleasure or enjoyment resulted from technology adoption (Brown & Venkatesh, 2005). HM affect behavioral intentions (Liao and Lin, 2007; Taylor and Venkatesh, 2010). However, technology adoption differs across stages of technology adoption. There are six dimensions of HM (Arnold & Reynolds, 2003), adventure, social, gratification, idea, role, value & other hedonic dimensions as pleasure, arousal and escapism (Monsuwe et al., 2004).In another context it represents the extent to which the Information system is considered entertaining (Venkatesh et al., 2012). Initially Information systems was designed as a task oriented, the focus of adoption was on utilitarian factors such as PU and PEOU (Thong et al., 2006) but this concept changed to include an entertaining value , where it became more entertaining and enjoyable (Dwivedi et al., 2015).

Perceived enjoyment can be considered as a component of hedonic motivation. Also, it is used interchangeably in this research as hedonic motivations are operationalized as perceived enjoyment. Enjoyment is an antecedent of PEOU & PU as an enjoyable system is easier and more useful (Agrwal & Kharahanna, 2000; van der Heijjden, 2004; Conci et al., 2009). Similarly, in a study conducted on first

line managers on mid-sized companies on their usage of computers, PU and PEOU. (Fagan et al., 2008). Also, perceived enjoyment is fully mediated by PU and PEOU and it has no direct effect on behavioral intentions in the presence of PU and PEOU (Venkatesh et al., 2002 ;Zhang et al.. 2003).

H1: Hedonic motivation has a positive significant relationship on perceived usefulness

H2: Hedonic motivation has a positive significant relationship on perceived ease of use

Convenience (CONV)

Convenience can be described as of a product or a service. It can be considered when it saves time, and cognitive, emotional and physical burden on user (Berry et al., 2002). There are three dimensions of convenience as described by Yoon & Kim (2007), time, place and execution. Thus, it refers to the performance of a task at any time, in any place and in a burden less manner. Convenience feature of Smart Phones are evident as individuals are not tied to immobile workstations such as desktops at home office which resulted in convenience in terms of performing daily routines while waiting for any official duties or task. With a free software download, the consumer has become highly independent on smart phones to retrieve the information by single touch and click to access the smart phone as it is with them wherever they go (Islam et al., 2010; Genova , 2010). Shopping online is convenient as it provides the opportunity to shop 24/7 days a week (Hofacker, 2001). Interactive shopping reduces the costs of acquiring information Pre-purchase while increase search benefits by providing a broader collection of product alternatives at a minimum cost (Bakos, 1991)

As concluded by Yoon & Kim (2007), PEOU is one of the antecedents of perceived convenience. While convenience is one of the antecedents of PU. Similarly, this is true for e-learning systems using mobile learning (Chang et al., 2012). Furthermore, on E-learning system MOODLE, the TAM Model was extended by perceived convenience (HSU & Chang, 2013). Confirming on the previous discussed literature, convenience was an antecedent for Perceived Usefulness and affected by PEOU. As of Childers et, al., (2001), convenience has a positive effect on PE and PEOU.

H3: convenience has a positive significant effect on Perceived usefulness.

H4: convenience has a positive significant effect on Perceived ease of use.

In a study conducted of information searches of tourists using mobile technologies, the quality of Ubtiquous tourist information has four dimensions, interface design, system quality, convenience & system quality. Convenience didn't have a significant impact on enjoyment (Kim et al., 2012). However, in another study on online shopping, there was a significant relationship between Convenience and enjoyment (Childers et al., 2001).

H5: Convenience has a positive significant direct effect on hedonic motivation

Social influence (SI)

Social influence is defined as "the degree to which an individual perceives that other important persons believe he or she should use the system" (Kripanont, 2007). Moreover, it refers to the way other people affect a person's beliefs, feeling and values (Foon et al., 2011: Jaganathana et al., 2014). Also, it is the degree to which significant people to the user perceive that technology is crucial to him (Diaz & Loraas, 2010). It is similar to the factor "subjective norm" as defined in Technology of Acceptance Model (TAM)2, subjective norm contains the explicit or implicit concept that the technology users are influenced by the way they believe others will view them as of technology usage (Chang 2012).Subjective norms are used similarly with SI and it is defined as of theory of technology reasoning acceptance and theory of planned behavior as significant as we consider other perception of what we should do or want us to do (Fishbein & Ajzen, 1975). Furthermore, it is the influence of an individual social environment on his or her behavioral intentions (Zhang et al., 2012).

SI has a positive direct relationship with PEOU and PU as confirmed by literature (Farahat, 2012; Marsom , 2007; Park 2009 & Ramayah et, al., 2005). Similarly, subjective norms had a significant effect on perceived usefulness and behavioral intentions (Venkatesh and Davis, 2000). Also there are a

significant direct effect between subjective norms and PU but indirect relationship with behavioral intentions (Rose and Fogarty, 2006) and a direct relationship (Scheper & Wetzels, 2007).

As of the relationship between social influence or subjective norms on Perceived enjoyment or hedonic motivations, Park et al, (2016) study on the behavior of mobile communication users on 3G services found that SI had a significant relationship on both PU and perceived enjoyment; however, it has a higher influence on perceived enjoyment. Thus, researchers implicated on the importance of considering the effect of relatives and friends in designing marketing campaigns. Also, as mobile payments adoption, social influence has shown to affect user's behavior in adoption of mobile phone services (Lee et al., 2009) mobile internet (Kim, Chan And Gupta, 2007) and online game communication (Hsu & Lu, 2007). It is evident that perceived enjoyment is a socially constructed phenomenon as many hedonic products are consumed in presence of others (Raghunath and corfmm, 2006). So Mobile payments tends to affect positively perceived enjoyment and PU (Lewis et al, 2015; Venkatesh et al., 2012)

Thus, the following hypothesis was deduced as the above literature,

H6: Social influence has a positive significant direct effect on Perceived usefulness.

H7: Social influence has a positive significant direct effect on Perceived ease of use.

H8: Social influence has a positive significant direct effect on hedonic motivations.

Method

This study aimed to collect data across Smartphone owners who conduct Mobile shopping to test the proposed research model and its corresponding hypotheses. The survey items used to measure the constructs were extracted from literature. There are 5 variables in this questionnaire; PEOU, PU, CONV, HM and SI. Convenience scale was developed by Chang et al., (2012). While other variables HM and SI were extracted from the scales developed by Vanketesh et al,(2012), on developing his extension for the UTAUT2 model. Finally, the two independent variables, PEOU and PU were extracted from the original TAM model. Each questionnaire item used a 5-point Likert-type scale that ranged from 1 (strongly disagree) to 5(strongly agree). The dimension for each variable was attached to the appendix. The questionnaire was translated into Arabic, so there were a version in English and another version in Arabic. Potential respondents were randomly approached as of convenience. This was conducted as the population of Mobile shoppers in Egypt is quite limited. The researchers checked to determine whether the potential respondents were appropriate for this study. They were asked whether they had participated in this survey before and whether they conducted mobile shopping in Egypt. After fulfilling these criteria, the respondent was given a questionnaire for completion.

A two-step approach involving structural equation modeling (SEM) was adopted for measurement scale validation and structural analysis (Byrne, 2000; Hair et al., 2010). The maximum likelihood estimation procedure was employed using AMOS Version 20. This study's proposed research model was analyzed following three main steps. First, a covariance matrix of all measured variables was constructed and subjected to a series of validity and reliability checks. Upon establishing the model fit, we estimated the significance and size of each structural parameter for the specified model. The detailed results of the analysis are discussed below.

Descriptive analysis

The questionnaire was administrated among a broad gender, age, education and occupation categories who had smart phones, the percentages of respondents are shown in table (1)

Table 1: Demographics

Characteristics	Frequency	Percentage
Gender:		
1. Male	93	46.5%
2. Female	107	53.5%
Age:		
1. Less than 25	96	48%

2. 25 to less than 30 years old	35	17.5%
3. 30 less than 40 years old	31	15.5%
4. 40 less than 50 years old	27	13.5%
5. 50 less than 60	10	5.0%
6. 60 or older	1	0.5%
Education:		
1. Uneducated	0	0%
2. Primary or preparatory	0	0%
3. High school graduate	71	35.5%
4. Graduate (Bachelor degree)	98	49%
5. Post graduate	31	15.5%
Occupation:		
1. Unemployed	12	6.0%
2. Employed in public sector	4	2.0%
3. Employed in private sector	63	31.7%
4. Business Owner	31	15.6%
5. Retired	1	0.5%
6. Student	88	44.2%

Data analysis

Reliability and Validity of Measurement Items

A confirmatory factor analysis (CFA) of all items was simultaneously conducted to evaluate the validity of the items and the eight underlying constructs in the measurement model. Table 2 summarizes the results of the measurement model across the model-fit indices. All model-fit indices indicate that the measurement model exhibits a good fit with the data collected. Hence, we proceeded to examine the measurement model's psychometric properties to evaluate its reliability and construct validity. Construct validity was examined using the test for convergent and discriminant validity. Convergent validity was evaluated using the attributes of factor loading, average variance extracted (AVE), and construct reliability (CR). Table 3 shows the factor loading, AVE, and CR values that were used to assess convergent validity for the CFA model.

Table 2: Measurement for goodness of Fit for CFA model

Goodness of Fit measure	
Chi-Square Value (X^2)	171.294
P value	0.001
DF	80
X2/DF	2.1
AGFI	.860
GFI	.907
CFI	.927
NFI	.874
RMSEA	.076

Note. GFI = goodness-of-fit index; AGFI = adjusted goodness-of-fit index; CFI = comparative fit index; NFI = normed fit index; RMSEA = root mean square error of approximation.

Table 3: Factor Loadings, AVE, Item Reliability, and Construct Reliability

Factor	Item	Standardized factor loading	AVE	CR
CONV	CONV_1	.803	0.69	0.779
	CONV_2	.845		
	CONV_3	.771		
	CONV_4	.689		
HM	HM_1	.810	0.813	0.835
	HM_2	.870		
	HM_3	.834		
SI	SI_1	.899	0.853	0.842
	SI_2	.939		
EOU and PU	EOU_1	.654	.679	0.835
	EOU_5	.911		
	EOU_6	.778		
	PU_4	.537		
	PU_5	.774		
	PU_6	.619		

Note: AVE = average variance extracted; CFA = confirmatory factor analysis; CR = construct reliability; COV: convenience; HM: hedonic motivation; SI: social influence; PU: Perceived usefulness ; EOU: perceived ease of use

Table 4: The AVE and Squared Correlation Estimates

	HM	EOU_PU	CONV	SI
HM	**0.813**			
EOU_PU	0.502	**0.679**		
CONV	0.427	0.567	**0.69**	
SI	0.442	0.347	0.16	**0.853**

All scale items are highly loaded on their respective constructs, as all factor loadings are above the threshold value of 0.70 except for one dimension. Each indicator's item reliability, including CR, was above .70, suggesting good reliability and convergent validity. Notably, all CR values for the constructs in the model were above .7, which provides strong evidence that these measures consistently represent the same latent construct. The AVE values were compared with the squared estimate of the correlation estimates to assess discriminant validity. The correlation matrix in Table 4 shows that all AVE values are greater than the squared correlation estimates; this result confirms that a satisfactory level of discriminant validity has been achieved and indicates that the measured variables have more in common with the construct with which they are associated than with other constructs in the model. Furthermore, this finding indicates that all constructs in the measurement model are significantly different from one another.

Structural Model and Hypothesis Testing

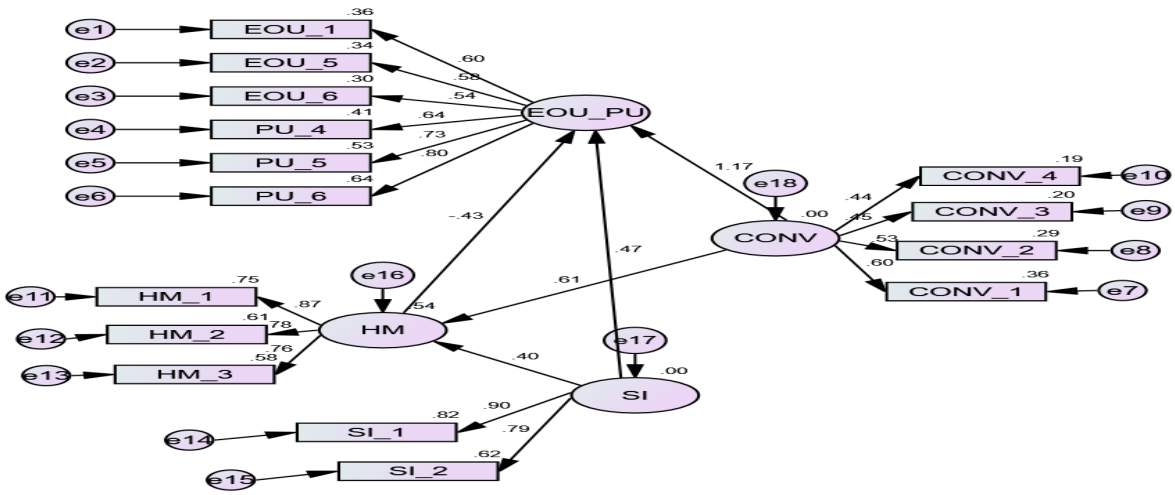

Figure-1: Path analysis

The results of the full structural model showed a good fit of the data to the model: $\chi 2/df$ = 1.865, goodness-of-fit index (GFI) = 0.923, adjusted goodness-of-fit index (AGFI) = 0.878, comparative fit index (CFI) = 0.947, normed fit index (NFI) = 0.895, standardized root mean square residual (SRMR) = 0.038, and root mean square error of approximation (RMSEA) = 0.066. This study tested each hypothesis by examining the path significance. Figure 2 illustrates the path diagram with the resulting fully standardized structural parameter estimates included on the paths. The paths from CONV, HM, and SI to Perceived usefulness and perceived ease of use as they are collected in one factor, are statistically significant in the current user group (as all p-values is less than 0.05). These factors explained 50.7% of the variance.

Discussion

As of exploratory factor analysis conducted, perceived ease of use and perceived usefulness did merge into one factor in this research. This can be explained that most the respondents perceived them similarly. On considering the effect of other variables such as hedonic motivations, social influence and convenience.

There is a direct positive relationship between all variables and Perceived ease of use and perceived usefulness. As follows, the standardized estimates are .983, .261 & .231 with no mediations. As it is evident, Convenience have the strongest effect on perceived usefulness and ease of use. However, while considering the paths between convenience and Hedonic motivation on one hand and social influence on hedonic motivation. The standardized estimate for the relationship between Hedonic motivation and perceived ease of use and perceived usefulness became a negative relationship. As a result, the mediation effect for convenience was tested. Also the mediation effect for Hedonic motivation was tested for the relationship between social influence and Perceived ease of use and usefulness.

Table 5: Hypothesis testing

Paths	Standardized estimates	P-value	Hypothesis supported
CONV →EOU-PU	1.114	0.001	H1 &2 Supported
HM→EOU-PU	-0.43	0.041	H3 &H4 supported
SI →EOU-PU	0.457	0.001	H6 & H7 supported
SI →HM	0.426	0.001	H8 supported

CONV →HM	0.571	0.001	H5 supported

As of table 6 results, the indirect effect of hedonic motivation on the relationship between convenience perceived usefulness and ease of use is negative despite the positive relationship between hedonic motivation and perceived usefulness and ease of use. So we can deduce that convenience tend to revert he positive relationship between hedonic motivation and PU and EOU however, the P-value is higher than .05 as a result, we cannot consider the mediation effect of hedonic motivation.

As of the indirect effect of hedonic motivation on the relationship between social influence and perceived usefulness and ease of use is positive and reinforcing however, the p-value of the indirect effect is higher than .05. Also this mediation isn't significant.

However, on considering both hedonic motivation & convenience, they are fully mediating the relationship between social influence and perceived usefulness and ease of use.

Table 6: Mediation analysis

	Total effect	Direct effect	Indirect effect
CONV-HM-EOU_PU	0.959(.001)	1.091 (.005)	-0.132(.304)
SI-HM-EOU_PU	0.314 (.035)	0.207(.088)	0.107(.388)
SI-HM-CONV-EOU_PU	0.369(.025)	0.168(.121)	0.207(.003)

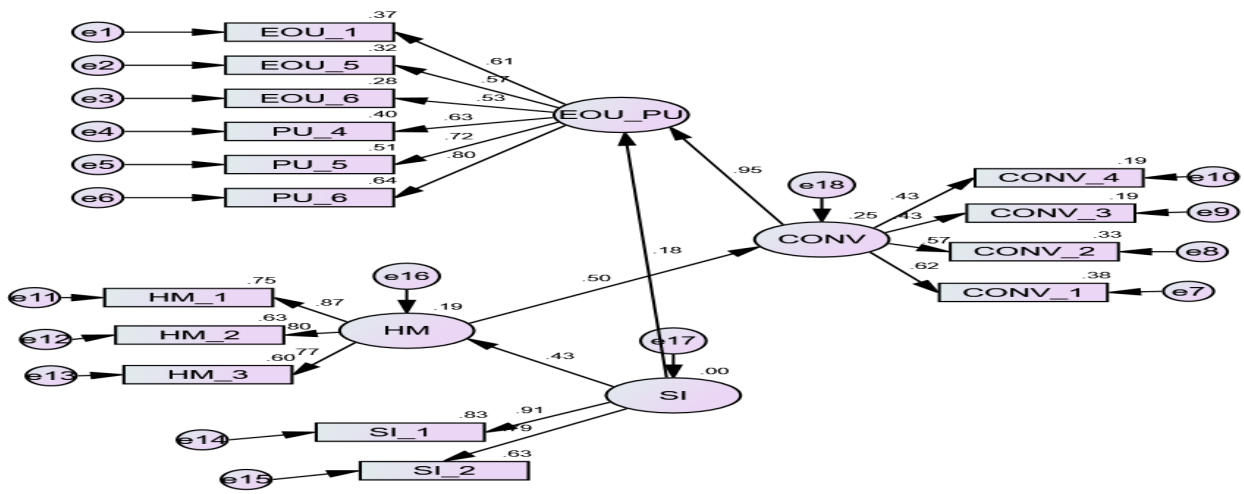

Figure 1: path analysis after mediation effect

Conclusion, implications and limitations

As it is evident from the discussion, that social influence, hedonic motivations and convenience are significant factors for enhancing the usefulness and ease of use of mobile commerce in Egypt. However, convenience tends to affect the usefulness and ease of use the most. Also, social influence could be fully mediated if the users found more enjoyment and effort saving either in terms of time or effort and they would consider it useful even though social influence are not in line with. In literature, social influence did have an influence however, with this new conclusion, marketers would focus more on developing more excitement and pleasure and convenience rather than focusing on other people's opinion in mobile commerce. For future research, the complete model including the adoption and usage of technology would be of benefit to consider such results when considered for usage. This research was conducted in Cairo only and it didn't consider other governates. Also, the sampling was more based on convenience which could provide a biased result.

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