AN EXAMINATION OF THE ROLE OF SOCIAL INFLUENCE IN SAUDI ARABIA: A STRUCTURAL EQUATION MODELING OF AN EXTENDED TECHNOLOGY ACCEPTANCE MODEL

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ABSTRACT

User's perceptions and believes are known for its effect on technology acceptance and use. The applicability and significance of including social influence using TAM was observed by several studies. Furthermore, studies examining the effect of social influence have examined different technologies, settings, countries, and produced contradictory findings. However, there is no study had examined the role importance of social influence in technology acceptance through TAM, particularly in Saudi Arabia. This study aims to identify the underlying factor and casual relationship that affect IT use. For this purpose, this research developed a conceptual model for examining the role of social influence on IT acceptance through TAM. This study used survey method adopting questionnaire technique to collect quantitative data. The collected data was analyzed using SEM analysis approach with AMOS. The findings show that social influence has a significant role to increase the IT usage either directly; and indirectly (via perceived usefulness, and ease of use. The research findings reflected that social influence was significant predictor of both perceived usefulness and ease of use, and therefore should be considered as potential factor

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for extending TAM. This paper has important implications on both theoretical and practical portion of IT usage in organizational settings in Saudi Arabia.

Keywords: Perceived Ease of Use, Perceived Usefulness, Social Influence, Structural Equation Modeling, and Technology Acceptance Model.

1. Introduction

User's perceptions to accept an Information Technology (IT) are possibly to be impacted by the characteristics of a technology, and user's differences (e.g. degree of technology usage, and workplace needs and demands). However, social influence theories argue that user's perceptions could be impacted by others' opinions and behaviors and socially referent others (the users who have effect others' opinions and behaviors), such as superiors in organizational setting (Yang et al., 2009; Yanga and Farn, 2009). Social influence reflects a user's perception of the social force to act (Guo et al., 2006; Law, 2007). Social influence is major determinant on users' behaviour to accept, and thus use a technology (Law, 2007; Baleghi et al., 2014; Bennani and Oumlil, 2014).

From this point of view, several structural contexts could affect user's perceptions, actions and experiences. The literature review shows that social influence is a major factor in determining actual system use in technology acceptance theories such as the, Theory of Reasoned Action (TRA), Theory Planned Behavior (TPB), Decomposed Theory of Planned Behavior (DTPB), TAM2, Unified Theory of Acceptance and Use of Technology (UTAUT). However, social influence is not a major determinant in the acceptance theory called, Technology Acceptance Model (TAM). However, Yang et al., (2009) confirmed the important role of social influence in TAM. TAM is incomplete; because it did not take social influence into account in examining the acceptance of IT using TAM. Furthermore, the applicability and significance of including social influence using TAM was observed by several studies, such as (Malhotra and Galletta, 1999; Karahanna et al., 1999; Karahanna and Limayem ,2000; Legris et al., 2003; Hamid and Sarmad, 2008; Li et al., 2009; Al-Adwan et al., 2013). However, Lee and Wan, (2010) conducted a study on electronic ticketing for air travelers in China, reported that social influence fails be considered as an adoption factor in TAM.

Beyond technology adoption research social influence was comparatively rare used in IT research. But there are some researchers who evaluated the factor social influence in the context

of who controls the technology in team systems (Eckhardt, 2009). The determinants of different samples of user perception and acceptance across countries are still ambiguous. Therefore, it is a contentious to admit whether the technology acceptance theories that have been developed, adapted, and modified in developed counties could be applied in developing countries, specifically in Saudi Arabia (Al-Adwan et al., 2013).

2. Background

Studies on the adoption of IT in organizational settings have confirmed that examining the users' beliefs is the key to success implementation. It is dependent not only on the user's beliefs, but also on social influence. Studies that focus particularly on the impact generated by social influence are lacking (Miller and Brunner, 2008). However, practical tests of social influence on beliefs toward IT were produced contradictory findings (Yang et al., 2009). There are controversies, worth mentioning in the TAM. Research continues investigating the effect of social influence on perceived usefulness, and/or perceived ease of use. However, some studies found positive effect, such as studies conducted by (Karahanna et al., 1999; Venkatesh and Davis, 2000) on perceived usefulness of e-mail; (Karahanna and Limayem, 2000) on perceived usefulness of v-mail; (Lee, 2006; Yi, 2006; Raaij and Schepers, 2008; Park, 2009) on perceived usefulness of e-learning. Differently, a study conducted by (Karahanna and Limayem, 2000) found no effect of social influence on perceived usefulness of e-mail. Social influence is more significant factor in determining Instant Messages (IM) adoption than perceived usefulness and perceived ease of use. (Glass, 2010)

A few studies have addressed the effect of social influence on users' perceived ease of use, such as (Karahanna and Limayem, 2000), who reported positive effect of social influence on perceived ease of use of both e-mail, and v-mail. Also, a study reported positive effect of social influence on perceived ease of IT use by (Yang et al., 2009); and in internet use by Abbasi et al., (2011). Whilst, Park, (2009) found that social influence has negative effect on the users' perceived ease of use of e-learning.

A meta-analysis was conducted by (Schepers and Wetzels, 2007), confirmed that social influence leaves a significant effect not just on the users' attitude, and behavioural intention to

use, but also on actual system use. A few studies have addressed the impact of social influence on IT usage. Some studies reported that social influence has a positive effect on IT usage, such as (Karahanna and Limayem, 2000; Morris and Venkatesh, 2000) in information system; (Karahanna and Limayem, 2000) in e-mail; (Vannoy and Palvia, 2010) in IT; and Abbasi et al., (2011) in internet usage in Pakistan. However, the same study conducted by Karahanna and Limayem, (2000), found that social influence has no effect on v-mail usage organizational setting. Likewise, a study carried out by Raaij and Schepers, (2008) reported that social influence has no effect on e-learning usage educational setting in China.

Though, limited studies have addressed the role of social influence on technology usage. However, the findings are lacking and contradictory (Miller and Brunner, 2008). Furthermore, studies examining the role of social influence have been conducted on different types of technologies, settings, and type of users, which could produce different results. Abbasi et al., (2011) asserted that the effect of social influence is stronger in Asian countries. Yang et al., (2009) reported that the effect of social influence on IT usage is extremely subject to change depending on the scope of study, and thus it should not be generalized. Yet, there is no such conceptual model has been developed to address the role of social influence on IT usage, focus on Saudi Arabia particularly. For example, al-Gahtani et al., (2007) found that social influence has a positive effect on the behavioural intention to use (not on actual use) personal computer in Saudi Arabia. Therefore, there is an imperative need to examine the role of social influence on IT usage in Saudi Arabia. The objective of this paper is to develop a conceptual model for examining the role of social influence on IT usage in Saudi Arabia.

3. Conceptual Model

TAM is one of the most common used acceptance models has been developed by Davis, (1989). Davis (1989) defined TAM theory as "an information system theory that models how users come to accept and use a technology". An individual's acceptance is determined by two major factors according to the TAM, which are: perceived usefulness, and perceived ease of use, as shown in Figure 1. It is worth mentioning that TAM2 extended TAM by including subjective norm (also known as social influence) as an additional predictor of intention in the case of mandatory settings (Venkatesh and Davis, 2000).
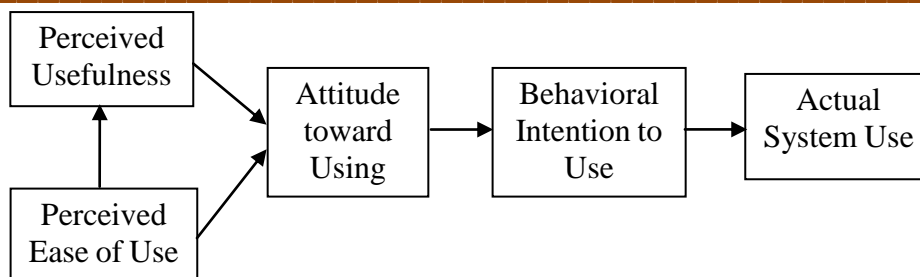
Figure 1: Technology acceptance model

Source: Davis (1989)

This study relied on part of the original TAM theory, for developing a new conceptual model. However, this study hypothesized that social influence would affect the IT usage either directly; and indirectly (via perceived usefulness, and ease of use). The concept of social influence (also known as subjective norm) assumes that the user has feeling of should or should not use a technology, because he under pressure of superiors and peers (Karahanna and Limayem, 2000).The new conceptual model proposed is shown in Figure 2.
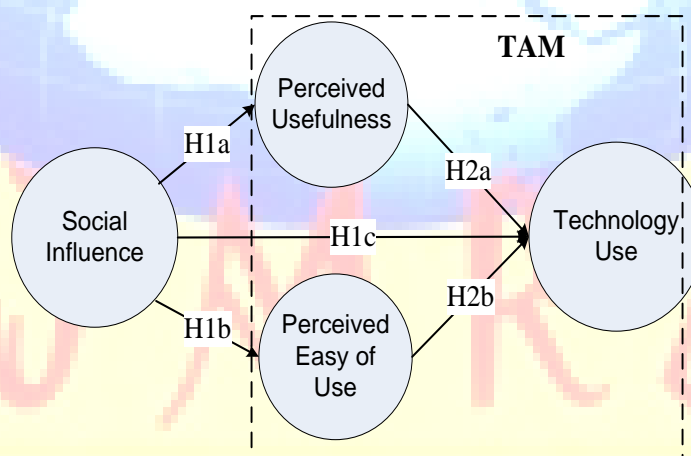

Figure 2: The proposed model

4. Method

Quantitative approach using survey questionnaire is common to be used, it is suitable when the variables to be surveyed have been explored in previous studies. A non-structured questionnaire (or closed questionnaire) with closed questions were used, in order to

facilitate the participants in answering the questions (Sekaran, 2009). All the questions in the questionnaire were evaluated on a five point Likert type scale. Meanwhile, questions that tested the hypotheses were adapted from previous studies such as social influence from Dorfman and Howell (1988); perceived usefulness, and perceived ease of use from Davis (1989); and IT usage from Adams (1992), with some modifications that were crucial to make appropriate questions for meeting the aim of conducting this study.

The questionnaire was translated from English into Arabic, as this study was carried out in Saudi Arabia (where Arabic is the official language). A pilot study was carried out to insure the reliability and validity of the questionnaire prior to the actual study. Cronbach's alpha was calculated for Reliability testing, resulted in .87 for the entire instrument. Validity was executed by submitting the survey questionnaire to expert panel to test the instrument's content. As a result, the survey instrument was reliable and valid, thus ready to be distributed.

This researcher has administered the questionnaire personally to collect data. A total of 740 questionnaires were distributed manually (by hand) to the targeted participants (officers) in organizations in Saudi Arabia, during 16th May until 24th August 2013, in 32 organizations allocated in various cities in Saudi Arabia. Ultimately, a total of 272 questionnaires were valid to be analyzed.

5. Data Analysis

5.1 Measurement Model

Reliability and construct validity was measuring, Confirmatory Factor Analysis (CFA) was performed to test the extent to which each item can represent its own construct, and confirm the construct structure. It is crucial to conduct convergent and discriminant validity, in addition to the reliability of the constructs, when achieving a CFA (Hair et al., 2010).

Table 1: Convergent validity and reliability

Construct	Item	Standardized Estimates	AVE	CR	A
PEOU	PEOU1	0.818	0.656	0.774	0.758

Construct	Item	Loading	AVE	CR	A
	PEOU2	0.672			
	PEOU3	0.858			
PU	PU1	0.792	0.818	0.826	
	PU2	0.824			0.891
	PU3	0.916			
	SI1	0.662			
SI	SI2	0.884	0.714	0.871	
	SI3	0.921			0.850
	SI4	0.863			
ITU	ITU1	0.752	0.736	0.787	
	ITU2	0.868			0.771

PEOU = perceived ease of usefulness, PU = perceived usefulness, SI = social influence, ITU = information technology usage, AVE = average variance extracted, CR = construct reliability, A = cronbach's alpha

As shown in **Table 1**, there is no item(s) with a factor loading value (standardized estimates) of less than 0.5, which are claimed as poor item(s) and fall into the deletion group. Convergent validity also evaluated to discover whether the indicators shared a high proportion of variance in common to their specific construct. Average Variance Extracted (AVE) and Construct Reliability (CR) are the two measurements were involved to identify convergent validity. According to Hair et al., (2010), an AVE value of higher than 0.5 shows sufficient convergence validity between an item and its construct. A CR value of higher than 0.7, also reflects that all items have a consistently represented construct. A Cronbach's alpha (α) value showing greater than 0.7 guarantees that the entire item was reliable to its construct.

Table 2: Discriminant validity

	PEOU	PU	IS	ITU
PEOU	**0.817**			
PU	0.440	**0.728**		
IS	0.313	0.184	**0.814**	
ITU	0.318	0.398	0.336	**0.866**

Note: Perceived Ease of Use = PEOU, Perceived Usefulness = PU, Social Influence = SI, IT Usage = ITU

   Discriminant validity was performed to ensure that a construct is greatly distinct compared to other constructs. The value is the square root of AVE for each construct must be more than the correlation value (as shown in **Table 2**), this to prove that each construct shares more variance in its item's measurement, compared to other constructs (Hair et al., 2010). On the whole, these results reveal that the measures in this study obtain adequate reliability and validity.

5.2 Structural Equation Modelling (SEM)

SEM was conducted to estimate the structural model 'goodness of fit', along with a test of the hypothesized effects among the four constructs. **Table 3** shows the model's goodness of fit; whilst **Table 4** shows a summary of the hypotheses results and Fig 1 shows the final structural model.

Table 3: Model's goodness of fit

Model fit index	Cut-off value	Result
Chi-Square (χ^2)	Small	86.454
p-value of χ^2	<0.05	0.0000
CMIN/Df (χ^2/df)	≤ 5	2.314
RMSEA	≤ 0.07 (Hair et al., 2010)	0.063
CFI	≥ 0.95 (Hair et al., 2010)	0.956
GFI	≥ 0.90 (Byrne, 2010)	0.937

AGFI	≥ 0.90 (Byrne, 2010)	0.914
NFI	≥ 0.90 (Hu and Bentler 1999)	0.938
TLI	≥ 0.95 (Hair et al., 2010)	0.957

The results in **Table 3** show a Chi-Square value of 86.454, which considered significant at 0.05 with a p-value of less than 0.05. Hair et al., (2010) revealed that a dataset with a sample more than 250 respondents and an observed variable of less than 12 tended to have insignificant *p*-values, even with a good fit. Normed Chi-square, which was well-known by CMIN/Df, has a value of 2.314, which is less than 5. Other fit indices values are specified by 0.063 for RMSEA, 0.956 for CFI, 0.937 for GFI, 0.914 for AGFI, 0.938 for NFI, and 0.947 for TLI. Overall, since all of the fit indexes have values lower than their cut-off value. Thus, the results demonstrate that this model was well fitted to the data. Figure 3 shows the hypotheses testing results; and **Table 4** reveals a summary of the hypotheses results.
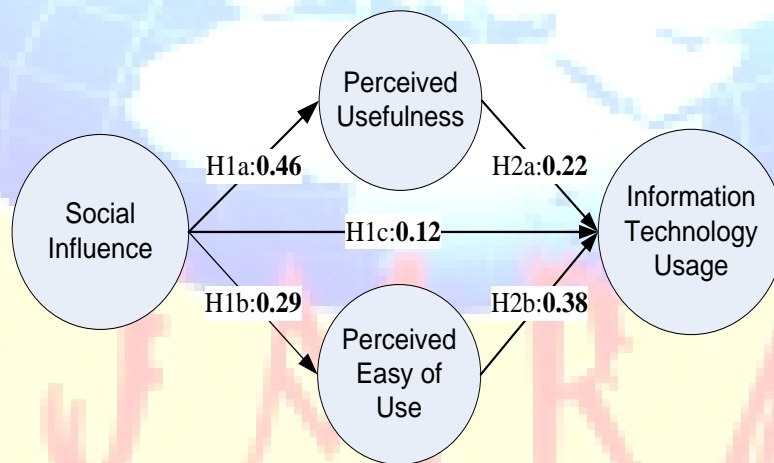

Figure 3: The final structural model

Table 4: Summary of hypotheses results

Hypothesis	Path	Coefficient	Standard Error	Critical ratio	Supported or not
H1a	SI → PU	0.46***	0.072	4.384	Yes
H2a	PU → ITU	0.22***	0.069	2.697	Yes
H1b	SI → PEOU	0.29***	0.062	2.578	Yes
H2b	PEOU → ITU	0.38***	0.114	2.344	Yes
H1c	SI → ITU	0.12***	0.093	2.987	Yes

Significance levels are *** $p < .001$, ** $p < .01$, * $p < .05$, n.s not significant

Note: Perceived Usefulness = PU, Perceived Ease of Use = PEOU, Social Influence = SI, IT Usage = ITU

H1a: Social influence has a positive effect on users' perceived usefulness of IT usage.

From hypothesis testing of H1a, social influence has significant direct effect on perceived usefulness by 0.46. R-square value for perceived usefulness reflects that 17.6% of variances in perceived usefulness were explained by social influence. This implies that the social influence increases the user's perceived usefulness of IT usage. Thus, the hypothesis was supported.

H2a: Users' perceived usefulness has a positive effect on IT usage.

From hypothesis testing of H2a, user's perceived usefulness of IT has significant influence on IT usage, since the p-value given was less than 0.05. The effect of users' perceived usefulness on IT usage is by 0.22; with R-square value for IT usage reflects that 21.8 % of variances in IT usage were explained by user's perceived usefulness. This implies that user's perceived usefulness of IT usage was able to motivate users' use of IT. Thus, the hypothesis was supported.

H1b: Social influence has a positive effect on users' perceived ease of use of IT usage.

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From testing hypothesis of H1b, social influence has significant direct effect on perceived ease of use by 0.29. R-square value for perceived ease of use reflects that 23.1 % of variances in perceived ease of use were explained by social influence. This implies that the social influence increases the user's perceived ease of IT use. Thus, the hypothesis was supported.

H2b: Users' perceived ease of use of IT usage has a positive effect on IT usage.

From hypothesis testing of H2b, user's perceived ease of IT use was significant, having a positive effect on IT usage by 0.38; with R-Square value for IT usage reflects that 24.7 % of variances in IT usage were explained by user's perceived ease of use. This implies that the user's perceived ease of IT use motivates IT actual use. Thus, the hypothesis was supported.

H1c: Social influence has a positive effect on IT usage.

From hypothesis testing of H1c, social influence was significant to have a positive effect on IT usage by 0.12. The R-square value for IT usage demonstrates that social influence explained 27.3 % of the variance in IT. Thus, the hypothesis was supported.

6. Findings

6.1 The indirect effect of social influence on IT usage (mediated by users' perceived usefulness).

As observed, the results of testing (H1a) reflect that social influence increased user's perceived usefulness of IT use. However, the expected results of testing (H2a), was that perceived usefulness of IT did increase IT usage. Thus, the results of testing (H1a and H2a) indicate that the indirect effect of social influence towards IT usage was fully mediated by users' perceived usefulness.

It is worth mentioning that, in this study, perceived ease of use exerts the strongest effect on IT usage. This study provides evidence that social influence has an effect on the perceived ease of use of IT in Saudi Arabia.

This finding is consistent with studies such as (Karahanna et al., 1999; Venkatesh and Davis, 2000) on perceived usefulness of e-mail; (Karahanna and Limayem, 2000) on perceived usefulness of v-mail; (Lee, 2006; Yi, 2006; Raaij and Schepers, 2008; Park, 2009) on perceived

usefulness of e-learning. However, this finding is in contrast to a study conducted by Karahanna and Limayem (2000), who found no effect of social influence on perceived usefulness of e-mail.

6.2 The indirect effect of social influence on IT usage (mediated by users' perceived ease of use)

The results of testing (H1b) reveal the influence of social influence in increasing user's perceived ease of IT use. Furthermore, the results of testing (H2b) show that user's perception of ease of use does increase their IT usage. Thus, the results of testing (H1b and H2b) reflect that the perceived ease of use of IT was a mediator on the effect of social influence on IT usage.

This finding is consistent with a study by Karahanna and Limayem (2000), who reported positive effect of social influence on perceived ease of use of both e-mail, and v-mail. The same findings found by (Yang et al., 2009) on perceived ease of IT use; and in internet use by Abbasi et al., (2011). However, this finding is in contrast with a study by Park (2009), who reported that social influence has negative effect on the users' perceived ease of use of e-learning.

This finding provides evidence that socially influence of users on each other as a strategy would lead users to perceive IT as being easier to use, then adjust to adopt IT to satisfy user's needs to engage more effectively and efficiently.

6.3 The direct effect of social influence on IT usage

This finding reflects that the impact of social influence was directly affecting IT usage. Thus, the finding implies that the provision of more social influence among teams would accelerate the use of IT. The finding is consistence with (Karahanna and Limayem, 2000; Abbasi et al., 2011; Morris and Venkatesh, 2000; Vannoy and Palvia 2010). However, this finding is in contrast with (Karahanna and Limayem, 2000; Raaij and Schepers 2008). The finding confirms the importance of social influence in accepting and using IT in organizational context in Saudi Arabia.

7. Theoretical and Practical Implications

Theoretically, this study contributes by adding to the limited theoretical literature on the role of social influence in IT acceptance research field. This study also extends the TAM theory into the evaluation of the IT usage, particularly in Saudi Arabia. Furthermore, this study carried out a sufficient review with regard to the role of social influence and the existing models on IT usage

and acceptance. The new developed conceptual model is applicable for technologies other than IT.

Practically, the findings provide a guideline for adopting IT in order to enhance collaborative work among teams in organizations in Saudi Arabia. This paper discovered the wide range of issues such as the social influence as motivation of teams on each other to use IT. Thus, teams might lead to broaden use of IT, which would increases the number of users of IT. Recognizing the significant source of influence for teams to affect each other can build in diffusion strategies of innovative IT. Identifying critical and responsive opinions is the key to gaining advantage of a team's psychology to allude to social influence in the decision-making of use technology. Thus, leaders in organizations in Saudi Arabia require rising collaborative work with socially influential users in teams and getting them to support organizational IT usage.

8. Conclusion and Future Work

The research findings reflected that social influence was significant predictor of both perceived usefulness and ease of use, and therefore should be considered as potential factor for extending TAM. This study success in developing a new structural model, this model has examined, and discovered the social influence role on IT usage in organizations in Saudi Arabia. The significant findings show that the social influence role on IT usage is worthy of being examined further, through TAM, in various technologies and settings. The structural conceptual model is applicable for further studies in different countries (cultures), technologies, which could lead to different findings. Future research should use SEM technique with the LISREL program, which can lead to different statistical results. In addition, future researches are advised to combine both quantitative and qualitative approaches, where it would collect data in depth.

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