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An Empirical Investigation to Validate the Technology Acceptance Model (TAM) in Explaining Intentions to Shop Online in Saudi Arabia using SEM

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Abstract
This study uses structural equation modeling (SEM) to investigate how theoretically applicable the technology acceptance model (TAM) in an online shopping context in Riyadh, Saudi Arabia. Three hundred and twenty-two subjects participated in a pre-piloted questionnaire survey that was created using existing scales from prior TAM instruments, which were modified when appropriate. Response rate was 96.2%. Our findings showed that our model is able to create an understanding that is better than the original online shopping intention model. Our results also showed that direct paths from bother perceived usefulness additional perceived ease of use to online shopping intentions would help to improve the model's predictive power and would improve fit more than the original TAM model would. The model explains 81 percent of Saudi consumers' intentions to continue shopping online and can be generalized across Riyadh.
Keywords: Usefulness, Ease of use, Attitude, TAM, SEM, KSA

1. Introduction

There has been phenomenal growth in the Internet since it was commercialized in the early 1990s, and vast marketing opportunities have emerged during this time. Web sites serve as marketing channels with which to sell products from all over the world to all countries, including less-developed ones. This development has led researchers and organizations to attempt to explain how individual usage can be enhanced by acceptance of information technology (IT). In this area, Fred Davis developed the technology acceptance model (TAM) (Davis, 1986) to explain the ways in which users accept and use certain technologies. Davis et al. (1989) explained that the target of TAM is "to provide an explanation of the determinants of computer acceptance that is general, capable of explaining user behavior across a broad range of end-user computing technologies and user populations, while at the same time being both parsimonious and theoretically justified" (p. 985).

The basis of TAM construct has built on the theory of reasoned action (TRA), a social psychology model that deals with the determinants of consciously intended behaviors. As Figure 1 shows, the TRA proscribes that the way in which a person performs a specific behavior is determined by that person's behavioral intention (BI) to act in that way, and BI is determined both by the person's attitude (A) and subjective norm (SN) regarding the behavior.

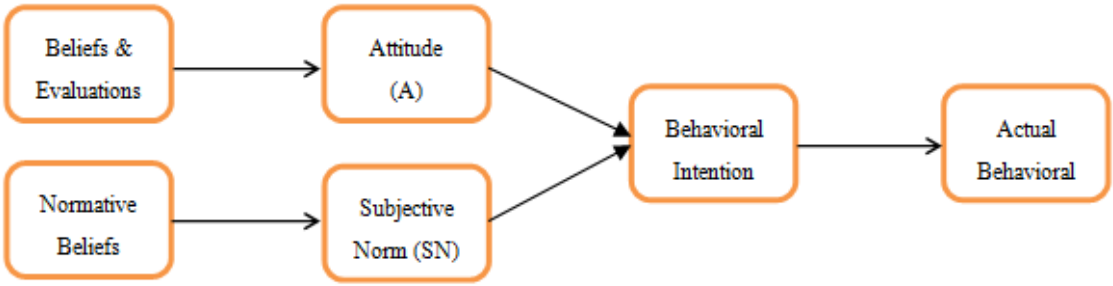

Figure 1. Theory of Reasoned Action-TRA (Based on Fishbein & Ajzen, 1975)

TRA provides a theoretical basis for TAM in terms of specifying the causal linkages that exist between two important sets of constructs. The first set is PU and PEOU, while the second is the user's attitude (A), behavioral intentions (BI), and actual computer usage behavior. PU has been defined, with regard to the user, as the subjective probability that using a specific application system will increase his or her job performance within an organizational context; whereas PEOU is the degree to which the user expects the target system to be free of effort (Davis et al., 1989). PU and PEOU both predict the attitude (or desire) of a user toward using the system. User's attitude and PU both influence the BI of an individual to use the system, while BI predicts the actual use of the system (see Figure 2).

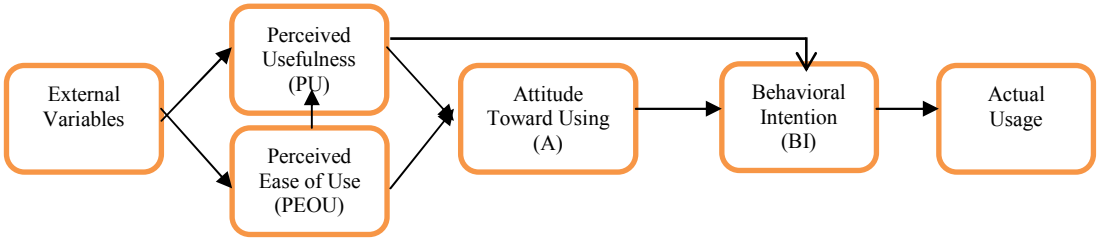

Figure 2. Technology Acceptance Model-TAM (Based on Davis et al., 1989)

TAM is one of the most widely used IT models, partly because it is simple and easy to understand (King & He, 2006). However, several studies of online shopping have identified a need for closer examination of online shopping intentions in certain countries, largely due to cultural differences and the imperfection of technology acceptance relationships in various consumer markets (Yulihasri & Daud, 2011; Lim & Ting, 2012; Aggorowati, et al., 2012). Given the difficulty of measuring similarities and differences between people in different countries, it is also difficult to create and recommend rules that explain how users accept a system. Some studies have focused on online shopping in a global sense. Because of the early stage of development that online shopping is at in Saudi Arabia, there is little knowledge about how consumers behave in terms of adopting online shopping and the factors by which this behavior is influenced. As Al-maghrabi and Dennis (2012) clarified that no previous research considers internet shopping in Saudi Arabia or, specifically, continuance intentions for online shopping in Saudi Arabia.

The aim of the present study is to fill this gap by investigating the ways in which consumers form attitudes and intentions regarding online shopping. The research framework's underlying theoretical grounding is TAM, because it provides a valid basis with which to explain and predict consumers' intentions towards online shopping. There are two ways in which knowledge generated by this study will contribute to the literature. First, with regard to theory, the study's empirical investigation validates the TAM of Saudi consumers in relation to online shopping. The research confirmation minimizes the inaccuracy in measurement, which means that the research findings can be interpreted with greater confidence. Consequently, it is vital to have an instrument validation in order to replicate published research (Abbas et al., 2013). Second, with regard to practice, the finding will create a strategic directions and implications for online shopping development in Saudi Arabia.

2. Literature Review

2.1 The Model of the Technology Acceptance Model

Based on relevant literature and theoretical foundations, we employed the technology acceptance (TAM) model to investigate which factor among the technology acceptance influence consumers' online shopping adoption in the Saudi Arabian context. The TAM (Davis, 1989), which is based on the TRA is a powerful model with which to investigate how consumers accept and use information technology. In the present study, TAM was selected as the appropriate research model with which to explain online shopping adoption due to its ability to explain a considerable proportion of the variances between behavioral intentions and actual behaviors; this ability is derived mainly from studies of purchases of technology-related products (King & He, 2006). TAM suggests that perceptions or beliefs regarding an innovation are instrumental when developing attitudes that will lead to system utilization behavior (Davis, 1989). TAM also postulates that actual use of the system is determined by a user's behavioral intention to use, which is influenced by the user's attitudes regarding use. Although the original idea with TAM was to model how information systems are adopted in the workplace (Davis, 1989), two dimensions that consumer behavior scholars have identified as being particularly relevant for online shopping are PEOU and PU variables (Huang, 2008). As Figure 3 show, the research model for the present study predicted the following relationships.

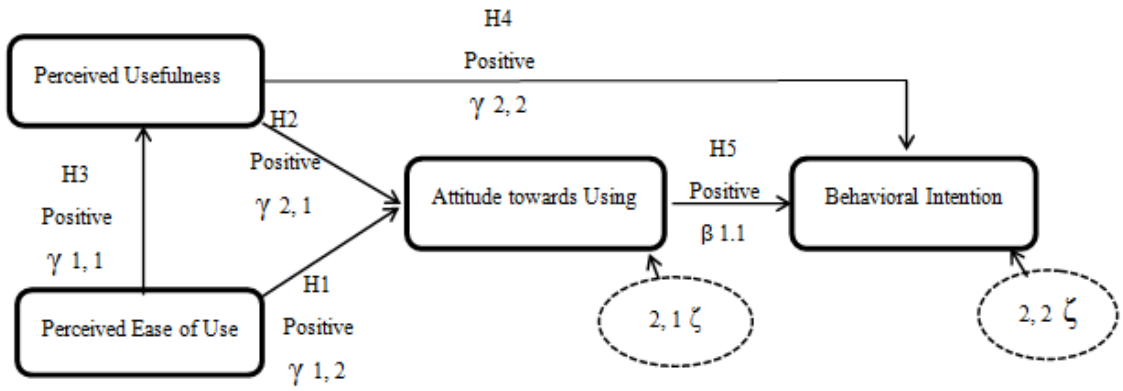

Figure 3. Research Framework Model

According to TAM, PEOU has a affected positively on the acceptance or non-acceptance of a appointed or certain technology, meanwhile defined PEOU as the focusing efforts, both physical and mental, that a user would expect to receive when considering whether to use a particular technology; in other words, it is the degree to which the technology would require effort from the user (Davis, 1989). Selamat et al. (2009) further noted that users are more likely to accept a technology that they perceive as being easier to use than a more complex technology, which will have a slower rate of adoption. Lim and Ting (2012) supported this claim, concluding that an easy-to-use system often requires less effort from users, which increases the likelihood that this technology will be adopted and used. Other researchers have found that perceived ease of use influences consumers' online shopping attitudes positively (Yulihasri & Daud, 2011; Aboelmaged & Gebba, 2013). Accordingly, we offer the following proposition: *H1 - PEOU has a positive significantly impact towards attitudes of online shopping.*

2.1.1 The relationship between the exogenous variables

TAM indicates that ease of use will influence a technology's perceived usefulness. If users find a certain technology easy to use, they expect greater benefits from that technology in terms of performance enhancement. Researchers have validated this relationship in an online technology context (Aboelmaged & Gebba, 2013; Lim & Ting, 2012). The findings from those studies are in line with Heijden (2000), who suggested that if online shopping site find by consumer is easy, they will perceive online shopping in general as being more useful. Accordingly, we offer the following proposition: *H3: PEOU has a positive significantly impact on PU.*

2.1.2 Perceived Usefulness (PU)

In the TAM model, another key determinant of attitudes regarding use is perceived usefulness, or PU which has been defined as the degree to which a user feels that a technology will enhance his or her performance of a certain activity (Davis, 1989). Aboelmaged and Gebba (2013) argued that the success of a shopping activity, in a consumer's mind, was determined by the ability of the activity to improve the consumer's shopping performance and shopping productivity, and, primarily, accomplish his or her shopping goals. This finding is in in accordance with those of Barkhi et al. (2008), who suggested that consumers develop favorable attitudes and intentions toward products/services that the consumers believe offer sufficient attributes or benefits regarding a solution and negative attitudes toward those products/services that are inadequate. In Line with that, Lim and Ting (2012) suggested that consumers will perceive as useful those online sites that provide functions to help consumers reach better shopping decisions. Childers et al. (2001) supported this argument, suggesting that consumers with favorable attitudes and positive intentions toward online shopping perceived online retailers as useful. Hence, we propose:

H2: The PU has a positive significantly impact on attitudes of online shopping.
H4: The PU has a positive significantly impact on attitudes of online behavioral intentions.

2.1.3 Attitude and Intention

Attitude is commonly recognized as a cause of intention (Suki & Ramayah, 2010). Fishbein and Ajzen (1975) categorized attitude into two distinctive constructs: the attitude toward an object, and attitudes toward the particular behavior. The first of these constructs is referred to as an individual's evaluation of a specific object, while the latter indicates an individual's evaluation of a particular behavior. In this light, TAM adapts the latter construct's categorization of attitude as the conceptualized operationalization of attitude; in its adapted form, this construct applies to the mediating affective response that exists between a consumer's beliefs about PU and

PEOU, and that consumer's intentions to use a particular target system (Suki & Ramayah, 2010). In an online shopping context, an online store's website is the main point of contact between a consumer and the online store (Ahn, et al., 2004). Study done by Suh & Han (2002) has underlined the importance of understanding what users expect and feel with regard to the websites they use. According to Al-Rafee and Cronan (2006), it was found that attitude is a major latent in terms of effect behavioral intention. According to Ahn et al. (2004), a consumer with a more positive online attitude for shopping will have a greater intention of engaging in online shopping among sites. Therefore, we posit: *H5: Attitudes of shopping online has a positive significantly impact on intentions.*
In addition to investigating the impact that independent variables have on dependent variables, we also study the proposed model's mediating effects. A user's attitude can mediate the impact of PEOU on a user's online intentions, and is the mediator of the impact on a user's online intention. Therefore, we posit:
H6: Attitudes toward online shopping are a mediator between PU and intentions.
H7: Attitudes toward online shopping are a mediator between PEOU and intentions.

2. Methods

We used a quantitative questionnaire to acquire empirical data relating to each of the TAM variables. Each scale had been used in previous MIS studies (the reported reliabilities - that is, the Cronbach's Alpha - for the scales exceeded 0.80). This instrument used measurement scales that had been validated previously and taken directly from an earlier study on consumers' e-commerce adoption (Straub et al., 2004). We pilot-tested the measures in order to validate the questionnaire items and justify the objective of the study, where the result was excluded from the study. The study was conducted in Riyadh capital of Saudi Arabia, thus the questionnaire have been translated (double-translation method) from English to Arabic And vice versa from specialist bilingual Arabian at Academic language center.

We faced several challenges in this regard, especially related to the design of sampling procedures, given that females in Saudi Arabia cannot legally or socially be approached by male strangers in Saudi Arabia. The challenges mentioned above led us to use a convenience sample only for Saudi citizens during the first half of 2012; these citizens were chosen from the Saudi capital of Riyadh. The questionnaires were hand-delivered to the participants so as to elicit voluntary participation; there was no interviewer to ask questions or guide the respondents. The survey was distributed to the female subjects by female researchers. Data were analyzed using SEM (14).

3. Results

Table 1. Characteristic of respondents (n=322)

Characteristic items		**Frequency**	**Valid Percent %**
Gender	Male	192	59.6
	Female	130	40.4
Education Level	High school	86	26.7
	Bachelor Degree	174	54
	Master Degree	49	15.2
	Doctoral Degree	13	4.1
Age	18 – 25	0	0
	26 – 35	111	34.5
	36 – 45	104	32.2
	46 and above	107	33.3
Income	Less than 5000 SAR	0	0
	5000-less 10000 SAR	74	22.9
	10000-less 15000 SAR	129	40.0
	15000 SAR and over	119	37.1
Frequency of online shopping	Never	0	0
	Twice per year	96	29.8
	Monthly	117	36.3
	Weekly	109	33.9
	Daily	0	0

A total of 338 respondents (96.2 percent of the overall response rate) responded fully to the questionnaire. We excluded a further 14 questionnaires from the analysis because those respondents did not complete a majority of the questionnaire sections. Consequently, we used a total of 324 questionnaires in the analysis. Two datasets were subsequently deleted because they had Mahalanobis (D2) values $\chi 2$ and greater

($\chi 2$=86.37; n=41, p<0.001), which left 322 responses for data analyzed; this represented a final total useable response rate of 91.7 percent. We considered the total number of usable responses (322) to be acceptable because the margin of error (accuracy) was ±5 percent and also because the confidence interval (CI) was 95 percent. A detailed description of the respondents' demographic statistics is presented in Table 1.

3.1 Exploratory factor analysis (EFA)

We used EFA to validate all constructs. The latent loadings that needed to be observed were greater than the 0.35 recommended level, at the 5 percent significance level (Hair et al., 2006); see Table 2. All output within the acceptable range.

Table 2. Exploratory factor analysis (EFA)

Exo. & Endo. (Variables)	**Exo. & Endo. (*items*)**	**Factor loading**
PEOU	PEU1	0.875
	PEU2	0.753
	PEU3	0.744
	PEU4	0.719
PU	PU1	0.765
	PU2	0.761
	PU3	0.695
	PU4	0.621
Attitude	AT1	0.811
	AT2	0.792
	AT3	0.714
	AT4	0.695
Behavioral intention	BI1	0.799
	BI2	0.783
	BI3	0.724
	BI4	0.708

Bartlett's sphericity test was significant (p<0.001), which supports the factorability of the correlation matrix.

3.2 Reliability test

Having completed the EFA, we used Cronbach's alpha to evaluate internal consistency reliability in order to test uni-dimensionality as can see in Table 3. Each of the constructs shows Cronbach's alpha readings that are above 0.60 and are therefore acceptable (Nunnally, 1978). Although 0.70 is the accepted cut-off point (Hair et al., 2006), any value >0.60 is considered to be satisfactory (Hair et al., 2006; Nunnally, 1978).

Table 3. Reliability Test

Variable		Items	Mean (Std. Dev)	α	Composite Reliability
First Endo.	PEOU	4	3.831 (0.795)	0.828	0.913
Second Endo	PU	4	4.098 (0.811)	0.742	0.819
First Exo.	Attitude	4	3.877 (0.799)	0.840	0.940
Second Exo.	Behavioral intention	4	4.087 (1.096)	0.754	0.879

3.3 Normality

Based on SEM, since the critical ratio is less than 1.96, we can consider a sample to be multivariate if it is normally distributed (Abbas et al., 2013); this indicates that that the data was distributed normally.

3.4 Confirmatory Factor Analysis (CFA)

Despite the good results produced by EFA, we used SEM to further analyze the 16 items noted in the CFA. As Table 4 & 5 shows, all outputs are reported good fit-index.

Table 4. Confirmatory factor analysis of all measurement models

CFA Model	Items	CMIN/df	TLI	NFI	GFI	AGFI	CFI	REMSEA
PEOU	4	1.465	0.999	0.999	0.997	0.981	0.999	0.028
PU	4	1.435	0.997	0.997	0.996	0.957	0.999	0.019
Att.	4	1.332	0.999	0.998	0.997	0.986	0.999	0.024
B. Int.	4	1.040	0.999	0.999	0.997	0.978	0.999	0.031

Table 5. Confirmatory factor analysis

Structured Model	CMIN/df	TLI	NFI	GFI	AGFI	CFI	REMSEA
Measurement (Exogenous)	1.151	0.999	0.993	0.986	0.973	0.999	0.020
Measurement (Endogenous)	1.432	0.997	0.993	0.982	0.962	0.998	0.034
Structural Model	1.139	0.992	0.969	0.927	0.912	0.993	0.027

3.5 Hypothesized Model Analysis

We used AMOS – structural equation modeling 14.0 with maximum likelihood (ML) estimation to variables relationship among the structural model that we had hypothesized. The data in the previous section adheres to this assumption. The hypothesized model in Figure 3 reveals (chi-square) of 321.32, df 282, and 0.000 *P*-value; these results indicate that data fit with the model. However, the chi-square statistic's high sensitivity to the sample size means that other fit measures may be more appropriate. All of these other fit measures also indicate the model's GOF to the data as presented in Table 6.

Table 6. GOF of the hypothesized model

Measures		**Fit Indices**	**Value accepted**
Absolute Level	RMSEA	0.027	Less than 0.08
	GFI	0.927	0.90 and Above
	P- Value	0.000	P- Value ≥0.05
Incremental Level	AGFI	0.912	≤ 0.90
	CFI	0.999	≤ 0.90
	TLI	0.992	≤ 0.90
	NFI	0.969	≤ 0.90
Parsimonious Level	CMIN/df	1.139	≥ 2.0
	(R^2)	0.719	High is better

3.7 Hypothesis Testing of Hypothesized Model

Abbas et al. (2013) stated that each parameter's un-standardized estimate contains regression weights (SE) and (CR), where estimation of the critical ratio (CR) is divided by SE.

Table 7. Results of regression weight for hypotheses Model

H.	Estimate	SE.	C.R.	P	Hypothesis Support
H1	0.818	0.053	15.396	***	Asserted
H2	0.258	0.030	8.667	***	Asserted
H3	0.358	0.037	9.792	***	Asserted
H4	0.222	0.051	4.317	***	Asserted
H5	0.226	0.042	5.337	***	Asserted

3.8 Mediating Effect of the Hypothesized Model

As seen in Table 8, a mediating effect is created to test the direct and indirect relationship of PU and PEOU toward intention mediated by attitude. Our results indicated that intention behavior toward online shopping does not act as a mediator between intentions to shop online and Exogenous, and it also has an insignificant indirect effect of 0.041, which does not support our hypothesized model (H6 and H7).

Table 8. Mediating results for the hypothesized model

Endogenous Variable (Intention to online shopping)			
	Indirect effect	Direct effect	Total effect
PU	0.011	0.421**	0.432**
PEOU	0.044	0.509**	0.553**

3.9 Model Generating

Based on Abbas et al. (2013), hypothesized model can be re-specify due to the data driven or theory support to create well-fitting hypothesized model. The modification indices of perceived intentions to shop online suggest that a path be added from attitude to intention. Figure 3 present the modified model, with standardized estimates. The positive path coefficient for the adding path suggests that the level of intention for online shopping will be

high if there is a positive attitude. This modification is accepted based on theoretical justification, thus, we accepted.

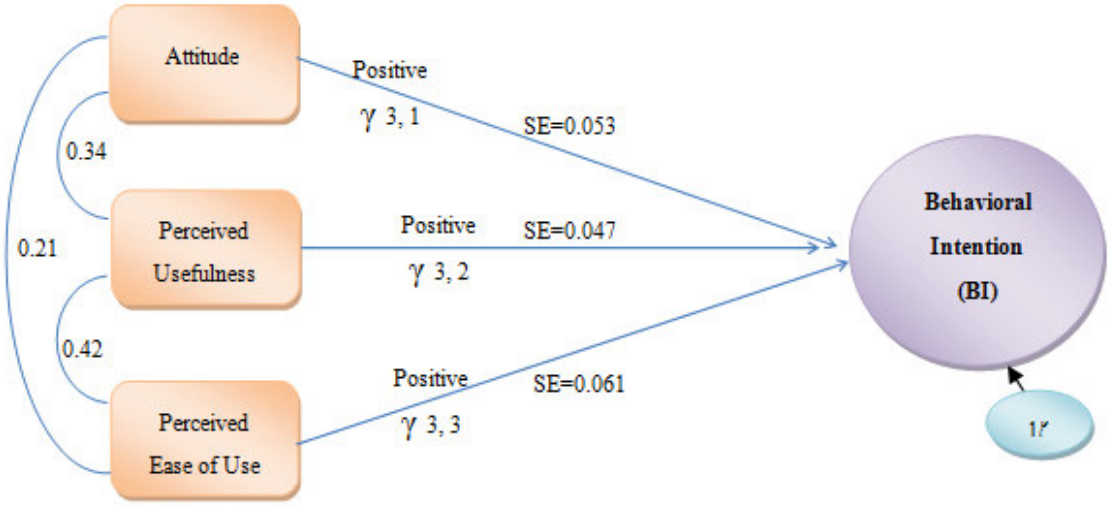

Figure 3. Structural Diagram for Model Generating

3.10 GOF indices of Model Generating

The TAM modification indices suggested that a direct path be added from PEOU and usefulness to intention, for which attitude is not significant mediator. The modified model, with standardized estimates, is presented in Figure 3. The fact that the adding path that more positive PEOU and usefulness will lead to higher intentions to shop online. Consequently, we decided to accept the modification. We used MI to develop a MG model with the intention of achieving a better-fitting model. This new model incudes direct path from PU, EU and attitude towards intention. Our results support this hypothesis, but found no significant effect for this mediation. The fact that the difference of the two (CMIN/df) enables us statistically test the significance of the (CMIN/df) difference. Hair et al. (2006) argued that it is usual to evaluate better-nested models using the difference of the (CMIN/df) as below:

$\Delta \chi^2 \Delta$ df = 321.32 – 327.70 = 6.38 (> 3.84)

Δ df = 282 – 281 = 1

Therefore, based on GOF output, better parsimony, and better fit model for the model generating.

4. Conclusion and Implications

Theoretically, our results offer several contributions to the existing literature. We have provided insights into the factors that appear to affect online shopping intentions in Saudi Arabia and have also posited that attitude, PEOU, and PU all have direct effects on online shopping intentions. Somewhat surprisingly, the mediating effect based on the original theory has rejected give support to our GM model that indicates that PEOU and PU both have a direct effect on online shopping intentions.

The result of this study emphasizes the concern of developing and managing the PEOU and PU of users in order to ensure that online shopping intentions are successfully implemented. However, the finding is also inconsistent with Taylor and Todd's (1995) study, which identified both PEOU and PU have a direct impact on intentions of consumer toward using system. Similarly, previous studies of online technology adoption have suggested that PEOU and PU are good predictors of usage intention (Aboelmaged & Gebba, 2013). A user who feels that he or she is capable of using an online shopping application will demonstrate a behavioral intention to use the application. Consumers may continue to use an online shopping service that they feel is useful. The research results are also similar to those of Yulihasri and Daud (2011) and Aggorowati, et al. (2012), which suggested a direct relationship between PU and intentions toward system use. Those findings reflect the un-pragmatic dimension of online shopping adoption decisions that are based on subjective and social acceptance.

Our generating model creates a much better understanding of internet shopping behavior among Saudi consumers in Riyadh, Saudi Arabia than TAM is able to. However, although our generating model is more effective than TAM, the latter can be used to demonstrate actual online shopping behavior.

5. Limitations and Future Research

This study has two main limitations. Firstly, because the study was conducted in Riyadh, the findings can only

be generalized to the people of Riyadh and cannot be readily generalized to other cities in Saudi Arabia. Future works may wish to overcome this limitation by including other parts of the country. Secondly, our study used convenience sampling, based on the understanding that the research was self-financed and also due to time limitations. However, this drawback is only a minor one and we believe that the use of convenience sampling method contributes significantly, at least at the exploratory level. In future studies, the selection of various sampling methods will be important in order to advance the usefulness of the obtained findings and to generalize the findings.

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