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Full Length Research Paper

Comparison of the theory of reasoned action and the theory of planned behavior: An application on accountants' information technology usage

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Because of efficiency and easiness that it provides, Information Technology (IT) usage has a vital meaning for all sectors. To derive benefits from IT completely, it has to be discovered in all aspects. The purpose of this study is to investigate the reasons behind accountants' IT usage and in this context, compare two social psychology based theories; the Theory of Reasoned Action (TRA) and the Theory of Planned Behavior (TPB). The data, obtained through a questionnaire that was responded to by 437 accountants, shows that if an accountant has a positive attitude and Subjective Norms (SN) towards IT usage, his/her intention towards IT usage is also positive, and the degree of intention is in proportion to the degree of perceived behavioral control. According to the stepwise regression analysis, TPB has higher predictive power than TRA.

Key words: Reasoned action, planned behavior, stepwise regression, accountant, information technology.

INTRODUCTION

In today's global business environment, one of the major concerns that have to be pondered is the adaptation of Information technology (IT) due to the dynamic and comprehensive nature of it. There is little doubt that information and communication technology has contributed immensely to the magnitude, speed, and acceleration of change in business practice over the past three decades (Hunton, 2002) and new IT often results in multiple outputs such as improved decision making and timeliness of reporting, increased and broader information avail-ability, increased productivity, and increased profitability (Dehning, 2002). However, along with all these advan-tages it brings challenging and competitive environment.

IT plays a critical role in modern business, especially regarding the accounting function (Efendi et al., 2006). Because of the rapid advances in IT, accounting practices practices underwent a great deal of changes. These rapid and enormous changes require more and comprehensive researches on the basis of accounting and IT. In recent years, IT researches on accounting increase in numbers, however, very little of them (Özer and Yılmaz, 2010 a; Özer and Yılmaz, 2010b; Özer et al., 2010; Taragola and Lierde, 2001; Yılmaz and Özer, 2008) is related to the IT usage behavior of accountants and analyzes the effects of attitude on IT usage. It shows that researches on behavioral dimensions of accountants' IT usage behavior are inadequate. This inadequacy directed us to make current research.

In recent study, we made use of Theory of Reasoned Action (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975) and Theory of Planned Behavior (TPB: Ajzen, 1991). Both two theories, having wide range of application in social psychology, are used to investigate behavioral dimensions of IT usage in a large number of studies and show high predictive power. Thus, we preferred to use these two theories comparatively and try to discover the behavioral aspect of accountants' IT usage.

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The TPB (Ajzen, 1991) extends the TRA by adding perceived behavioral control (PBC) as a variable that affects the intention towards behavior. The rationale behind the addition of PBC was that it would allow prediction of behaviors that were not under complete volitional control (Armitage and Conner, 2001). The relative importance of attitude, subjective norm (SN), and PBC in the prediction of intention is expected to vary across behaviors and situations (Ajzen 1991, p. 188). It is inferred from this explanation that the level of relationship between dependent variables (attitude, SN and PBC) and intention changes due to behavior.

Lots of studies and some meta-analyses based on the TRA and the TPB in a comparative manner are conducted in different areas, such as predicting unethical behavior, condom use, consumer online grocery buying, children's sunscreen use, knowledge sharing behaviors, adolescent smoking in China, etc. Armitage and Conner (2001) in their meta-analysis evaluate a database of 185 independent studies published up to the end of 1997 and found that the PBC construct accounted for significant amounts of variance in intention and behavior, independent of the TRA variables. These finding of Armitage and Conner's meta-analysis provide support for the efficacy of the TPB over the TRA. Madden et al. (1992) posited that the inclusion of PBC would significantly enhance the prediction of intentions, and the TPB explained significantly more variation than the TRA for behavioral intentions.

Chang (1998) claimed that PBC is a better predictor of behavioral intention than attitude, and TPB is better than TRA in predicting unethical behavior. Albarracin et al. (2001) examined how well the TRA and TPB predict condom use by conducting meta-analysis on the 96 data set reported in previous studies and results of the weighted mean correlations show that consistent with the TPB, PBC is related to condom use intention (r=0.45). Sheeran and Taylor (1999) also argued that the TPB provides a better account of intentions to use condoms than does the TRA and the TPB explains greater variance in intentions than does the TRA, the addition of PBC is significant in most instances, and the increased variance attributable to PBC is about 5%.

The results of the study (Hansen et al., 2004) that tested and compared the ability of the TRA and TPB in predicting consumer online grocery buying intention suggest that the TPB (with the inclusion of a path from SN to attitude) provides the best fit to the data and ex-plains the highest proportion of variation in online grocery buying intention. Another research (Martin, et al., 1999) that examines the children's sunscreen use by means of the TRA and the TPB displayed that stronger intentions to use sunscreen were found to be related to more favo-rable attitudes toward sunscreen use, stronger beliefs that peers and parents favored sunscreen use, and grea-ter perceptions of personal control in using sunscreen. In this study, PBC accounted for an additional 5% of the variability in intentions to use sunscreen. Guo et al. (2007) explored whether the TRA and the TPB predict adolescent smoking in China and inferred that TPB is superior to TRA for the prediction and TRA can better predict smoking among students with lower than higher PBC.

Kuo and Young (2008) found that TRA-based study shows a severe limitation in the ability of the intention to predict actual knowledge sharing behaviors. However, three variations of TPB-based models in their study show that, although the independent variables give satisfactory explanations of variance in intention (R^2 > 42%), the intention–behavior gap still exists in each of the three models. Ryu et al. (2003) stated that the TPB model appeared to be superior to the TRA in explaining physicians' intention to share knowledge.

The objectives of the current study could be summarized as follows; (1) to investigate the factors effecting accountants' intention towards IT usage, (2) to test predictive power of the TRA and the TPB, when they are applied to accountants' IT usage behavior; (3) to compare the predictive power of the TRA and the TPB in predicting accountants' IT usage behavior. The rest of the paper is organized as follows: In second section, we pre-sent background of both TRA and TPB models, research motivation and hypothesizes. In third section, we give information about research design. In forth section, we present results of the analyses and evaluate the two models.

The theory of reasoned action, planned behavior, and hypotheses

TRA addresses the impacts of cognitive components, such as attitudes, social norms, and intentions, on behaviors (Guo et al., 2007). According to this theory, a person's performance of a specified behavior is determined by his or her behavioral intention (BI) to perform the behavior, and behavioral intention is jointly determined by the person's attitude and SN concerning the behavior in question (Malhotra and Galletta, 1999). The TRA assumes that most human social behavior is under volitional control and, hence, can be predicted from intentions alone (Ajzen, 2002). This implies that we should be able to predict specific behaviors with considerable accuracy from intentions to engage in the behaviors under consideration (Ajzen and Fishbein, 2005). Behavioral intentions are motivational factors that capture how hard people are willing to try to perform a behavior (Chen et al., 2009). Attitude involves judgment whether the behavior is good or bad and whether the actor is in favor of or against performing it (Leonard et al., 2004). SN is proposed to have similar origins in a combination of people's perceptions that important others

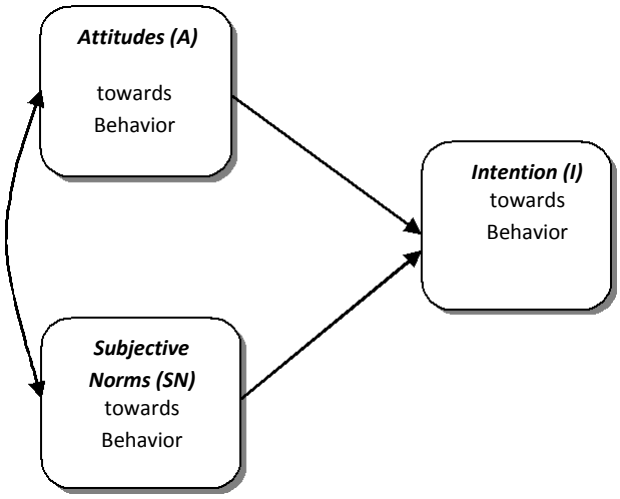

Figure 1. Theory of Reasoned Action, (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975).

think they should or should not perform the behavior in question and their motivation to comply with others' wishes (Spark et al., 1995).

TRA is very general, "designed to explain virtually any human behavior" (Ajzen and Fishbein, 1980), and should therefore be appropriate for studying the determinants of computer usage behavior as a special case (Davis et al., 1989). Because of that, many researchers have suggested and used TRA as a foundation to investigate individuals' IT usage behavior (Jackson et al., 2007; Taylor and Todd, 2001; Hsu and Lin, 2008; Leonard et al., 2004; Leonard and Haines, 2007; Kuo and Young, 2008, Chang, 1998; Rehman et al., 2007; Kukafka et al., 2003; Lu and Lin, 2003; Shih, 2004; Vijayasarathy, 2004; Igbaria et al., 1996; Liker and Sindi, 1997; Wu, 2003). The TRA is displayed in Figure 1.

In light of the literature review, a research model adapted from TRA and TPB has been developed to predict the effects of intention, attitude, SN towards IT usage and PBC on accountants' IT usage. According to that, attitude, defined as the user's evaluation of the desirability of his or her using the system (Mathieson, 1991) is one of the most important determinants of the intention towards IT usage behavior of accountants. Lucas (1975) and Taragola and Van Lierde (2001) suggest that the use of IT depends on attitudes about systems. With the positive and strong attitude towards IT, it is likely that accountants will develop positive and strong intention towards IT usage (Özer and Yılmaz, 2010a; Özer and Yılmaz, 2010b; Yılmaz and Özer, 200 8).

H_1: Accountants' attitude towards IT usage has a positive effect on intention towards IT usage behavior of accountants.

Most of the researches in the literature (Chang, 1998; Ryu et al., 2003; Özer and Yılmaz, 2010; Yılmaz and Özer, 2008) support that the SN has an important ro le in predicting intention towards behavior. If other related people feel that adopting the behavior is positive and the person is motivated to take these people's point of view into consideration, it is expected that the SN is positive and the accountant's intention towards IT usage behavior will also be positive (Yılmaz and Özer, 2008).

H_2: Accountants' subjective norms towards IT usage have a positive effect on the intention towards IT usage behavior of accountants.

Briefly, according to the TPB (Ajzen 1985, 1991), human action is influenced by three major factors: a favorable or unfavorable evaluation of the behavior (attitude towards the behavior), perceived social pressure to perform or not perform the behavior (SN), and perceived capability to perform the behavior (PBC) (Ajzen and Manstead, 2007). In comparison with TRA, TPB adds PBC as a determinant of behavioral intention (Hansen et al., 2004). As general rule of TPB, the more favorable the attitude and SN with respect to a behavior, and the greater the PBC, the stronger should be an individual's intention to perform the behavior under consideration (Ajzen, 2008, 538; Ajzen and Driver, 1992, 208; Ajzen, and Madden, 1986). The TPB is displayed in Figure 2.

The construct of PBC was added in an attempt to deal with situations in which people may lack complete volitional control over the behavior of interest (Ajzen,

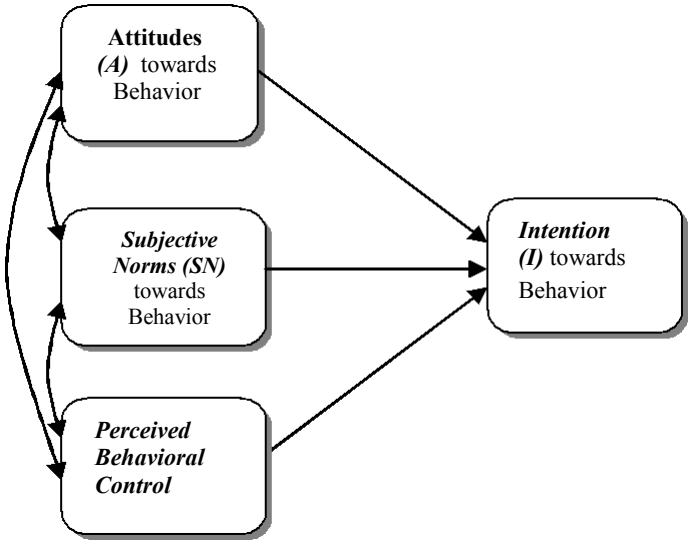

Figure 2. Theory of Planned Behavior, (Ajzen, 1985, 1991)

2002, 666). Although some behaviors may in fact meet this requirement quite well, the performance of most depends at least to some degree on such nonmotiva-tional factors as availability of requisite opportunities and resources (e.g., time, money, skills, cooperation of others) and collectively, these factors represent people's actual control over the behavior (Ajzen, 1991, 182; 2002). To the extent that people are realistic in their judgments of a behavior's difficulty, a measure of PBC can serve as a proxy for actual control and contribute to the prediction of the behavior in question (Ajzen, 2002, 666). Within the context of technology adoption, PBC relates to the individual's perception of the accessibility of IT and to the opportunities for its usage, and to an individual's self-confidence in his or her ability to use IT effectively (Baker et al., 2007). The greater PBC, the stronger should be an accountants' intention to IT usage and IT usage behavior. H_3: Perceived behavioral control has a positive effect on intention towards IT usage behavior of accountants.

METHODOLOGY

Data collection

The data is gathered from 437 accountants participated in this study. They were from in and around Istanbul. Questionnaires were distributed to accountants by hand and then collected the completed questionnaires.

Measurements

Since scale items in this study have been tested in previous researches, they are theoretically strong. The scales that measure accountants' intention to use IT were modified from the studies of Lee et al. (2005), Madden et al. (1992) and Cheng et al. (2006). Attitude scales were modified from the studies of Yang and Yoo (2004); Lee et al. (2005); Shih (2004) and Madden et al. (1992). SN scales were modified from the study of Baker et al. (1996); Girgin (2003); Madden et al. (1992). Finally, PBC scales were modified from the study of Madden et al. (1992), Ajzen and Madden (1986). All items included in the questionnaire are measured with 5-point Likert-type scale.

RESULTS AND ANALYSES

SPSS software is used to evaluate data. Factor analysis, correlation, reliability and stepwise regression analysis are used to analyze the relation between variables of the research models. For the TRA model, factor analysis addresses a structure with three factors, and these factors explain 62.669% of total variance. The KMO (Kaiser-Meyer-Olkin) (0.935) and Barlett Test ($p<0.000$) indicate that result of the analysis are significant (Mitchell, 1994, 6). In other words, the variables used in the questionnaire are appropriate for the factor analysis. Cronbach's α coefficient was used to measure the reliability and internal validity. All variables' of TRA model's cronbach α values are over 0.60 (Attitude: 0.833; SN: 0.870; Inten-tion: 0.896) and Cronbach's α values for the variables are greater than the correlation values among the variables, it could be stated that discriminant validity is provided (Gaski, 1984). Factor loadings of TRA are displayed in Table 1.

For the TPB model, items loaded to four factors and the KMO (Kaiser-Meyer-Olkin) (0.924) and Barlett Test ($p<0.000$) indicate that result of the analysis are

Table 1. Factor loadings of TRA research dimensions.

Factor and scale	Factor 1	Factor 2	Factor 3
Intention Towards IT Usage (Cronbach α: 0.896)			
I intend to use IT products in the future too.	0.716		
I think I will use information technology products regularly in near future.	0.738		
As regards of my profession, I intend to use IT products.	0.750		
After that I will make an effort to use IT in my profession.	0.691		
I will try to keep innovation which will occur in IT implementation.	0.697		
I intend to practice IT related changes to my profession.	0.717		
I believe that IT usage will become widespread in the future.	0.647		
Attitude Towards IT Usage (Cronbach α: 0.833)			
Using IT in my profession makes me feel happy.		0.623	
I feel that IT usage is a necessary instrument in accounting.		0.613	
Using IT product is an excellent idea.		0.629	
According to me, the idea of using IT in my profession is very wise.		0.559	
Using IT would be very pleasant.		0.609	
I like using IT production.		0.692	
Subjective Norms Towards IT Usage (Cronbach α: 0.870)			
Most people who are important to me think that using information technology products is a good idea.			0.717
Most of my friends are using IT products.			0.840
My friends and social environment give importance to using IT products.			0.863
I think most people who are important to me are inclined to use IT products.			0.745

significant. According to explanatory factor analysis, four factors explain 65.174% of total variance. TPB's total variance explained value is higher than TRA's. In other words, TPB has a greater explanatory power than TRA. All cronbach α values of TPB model (cronbach α value of TRA model's variables are given below. Perceive behavioral control: 0.887) are higher than 0.60 (the mini-mum value that could be accepted for the social science; Nunnally 1978; Malhotra 1993). Factor loadings of TPB Models are presented in Table 2. Correlation analysis shows that the correlations are statistically significant and positive at the 0.01 significance level among the variables of TRA model and 0.01 and 0.05 significance level among the variables of TPB model. Mean, standard deviation and correlation coefficients of TRA and TPB models' variables are displayed in Table 3.

In our study, Stepwise Selection Method of Multiple Regression Model is used. According to analysis, ANOVAs results show that TPB Model's F value of 225.074 and TRA Model's F value of 331.560 is statis-tically significant. It means that the TPB Model's variables and TRA Model's variables significantly predict intention. The regression analysis shows that accountants' attitude towards IT usage (TRA: $\beta=0.672$ $p<0.001$; TPB: $\beta=0.661$ $p<0.001$) and SN (TRA: $\beta = 0.165$; $p<0.000$; TPB: $\beta=0.159$ $p<0.001$) have a positive effect on intention towards IT usage behavior of accountants. According to this finding, accountants' positive and strong attitude increases the possibility of positive and strong intention towards IT usage. These findings provide evidence for previous literature. (Armitage and Conner, 2001; Ryu et al., 2003) and require the acceptation of H_1 and H_2.

As it stated above, TPB extends the TRA with the additional determinant; PBC. The third hypothesis, developed for TPB model, focuses the relationship between this determinant and intention. According to regression analysis, there is a statistically significant and positive relationship between PBC ($\beta=0.071$ $p<0.001$) and intention. This result justifies H_3. In both TRA and TPB models, β coefficients show that accountant's attitude in comparison with SN and PBC is more effective on intention. In addition, SN shows more predictive power than PBC to determine accountant's IT usage behavior but Armitage and Conner suggest that SN is weaker predictor of intentions than attitude and PBC. The findings confirm the general rule of the models; "the more favorable the attitude and SN with respect to IT usage of accountants (TRA), and the greater the PBC (TPB), the stronger should be an accountant's intention to IT usage". In this study, by using Stepwise Selection Method of

Table 2. Factor loadings of TPB research dimensions

Factors and scales	Factor 1	Factor 2	Factor 3	Factor 4
Intention Towards IT Usage (Cronbach α: 0.896)				
I intend to use IT products in the future too.	0.726			
I think I will use information technology products regularly in near future.	0.744			
As regards of my profession, I intend to use IT products.	0.761			
After that I will make an effort to use IT in my profession.	0.695			
I will try to keep innovation which will occur in IT implementation.	0.708			
I intend to practice IT related changes to my profession.	0.737			
I believe that IT usage will become widespread in the future.	0.654			
Perceived Behavioral Control (Cronbach α: 0.887)				
If I wanted to I could immediately start to use information technology.		0.847		
I have complete control over whether I use or not use IT products.		0.817		
For me, in the future it will be easy to use information technology products.		0.870		
If I wanted to I could easily use information technology products in my profession in the future.		0.900		
Subjective Norms Towards IT Usage (Cronbach α: 0.870)				
Most people who are important to me think that using information technology products is a good idea.			0.711	
Most of my friends are using IT products.			0.834	
My friends and social environment give importance to using IT products.			0.858	
I think most people who are important to me are inclined to use IT products.			0.741	
Attitude Towards IT Usage (Cronbach α: 0.833)				
Using IT in my profession makes me feel happy.				0.596
I feel that IT usage is a necessary instrument in accounting.				0.641
Using IT product is an excellent idea.				0.592
According to me, the idea of using IT in my profession is very wise.				0.535
Using IT would be very pleasant.				0.580
I like using IT production.				0.670

Multiple Regression Model, the selection of variation that defines the model best (Rahman, 2006) and the variables' independent contribution to predict intention and IT usage behavior were studied. In this method, the final model is given the last step (Rahman, 2006). The various stepwise procedures, in which we include also forward selection and back-ward elimination, are among the most popular and widespread techniques. They all provide systematic ways of searching through models, where at each stage new models are obtained by adding or deleting one variable from the models at the previous stages (Kadane and Lazar, 2004).

In statistics, stepwise regression includes regression models in which the choice of predictive variables is carried out by an automatic procedure (Hocking, 1976). In the model summary table (Table 4), the Adjusted R Square variable gives the proportion of variance that can be predicted by regression model using the data provided. In our study, the model summary table indicates that the third model with Adjusted R^2 of 0.607 and the variables of "attitude, SN and PBC" is the model that best fits the data. According to this result, it could be stated that TPB Model variables (attitude, SN and PBC) explain 60.7% of total variance of intention. The third model is also justified by significant R square change (0.005) and significant F change (5.392). The second variation (TRA) with Adjusted R^2 of 0.603 is also significant but TBP Model' adjusted R Square is higher than TRA's. It confirms the general acceptance of the lite-rature about that TPB was significantly better than TRA to predict specific behavior.

In multiple regressions the variables must not be highly

Table 3. Mean, standard deviation, correlation coefficients of TRA (1+2+3) and TPB (1+2+3+4) Model's variables.

	Means	Standard deviation	1	2	3	4
1 Attitude	4.4119	0.51425	1.00			
2 Subjective Norms	4.2357	0.60880	0.569**	1.00		
3 Intention	4.5237	0.52797	0.765**	0.547**	1.00	
4 Perceived Behavioral Control	4.1773	0.73025	0.192**	0.167**	0.225**	1.00

** Correlation is significant at the 0.01 significance level.

Table 4. Model Summary.

				Std. Error	Change statistics				
Model	R	R^2	Adjusted R^2	of the estimate	R^2 Change	F change	df1	df2	Sig. F Change
1	0.765[a]	0.586	0.585	0.34012	0.586	615.589	1	435	0.000
2	0.777[b]	0.604	0.603	0.33283	0.018	20.267	1	434	0.000
3	0.781[c]	0.609	0.607	0.33116	0.005	5.392	1	433	0.021

[a] Predictors: (Constant), Attitude; [b] Predictors: (Constant), Attitude, Subjective Norm; [c] Predictors: (Constant), Attitude, Subjective Norm, Perceived Behavioral Control.

correlated with one another (Rahman, 2006) and a tolerance of less than 0.20 and/or a VIF of 5 and above indicates a multicollinearity problem (O'Brien, 2007). It is inferred from the table that variables are not highly correlated with one another. In another words, there is no multicollenearity in our data for both two models.

DISCUSSION AND CONCLUSION

The main objective of this study was to assess the applicability of TRA and TPB for prediction of accountants' intention to use IT and to compare superiority of these two theories. The results of the study indicate that TPB is superior to TRA in predicting accoun-tants' intention to use IT; and attitude, subjective norm and perceived behavioral control influence accountants' intention. The findings of the recent study for both TRA and TPB models support the findings of many previous researches (Bock and Kim, 2002; Cheng et al., 2006; Chow and Chan, 2008; Özer and Yılmaz 2010a; Özer and Yılmaz 2010b; Ryu et al., 2003; Sheppard et al., 1988; Yılmaz and Özer, 2008). According to the find ings, the accountant's attitude, SN toward IT usage and the PBC have statistically significant and direct effect on intention. However, in literature, there are some different arguments related to interaction between intention and its determinants. For instance, Chang (1998) argued that the direct effect of SN on behavioral intention was not significant, but the indirect effect through attitude was highly significant.

The results show that attitude has more predictive power than SN and PBC. In addition, SN has more predictive power than PBC. Armitage and Conner (2001) claimed that the SN is weaker predictor of intentions than attitude and PBC. Contrary to Armitage and Conner (2001), and Chang (1998); Ryu et al. (2003) found that SN has the strongest total effects on behavioral intentions to share knowledge of physicians through direct and indirect path by attitude.

Randall (1991) indicated that PBC has a statistically significant effect on behavioral intention to share knowledge, but it adds little explanatory power to predicting accountants' intention to use IT. This result is inconsistent with Chang (1998). In his study, Chang found that PBC is the most important predictor of intention to use illegal software copies. However, Ryu et al. (2003) and Albarracin et al. (2001) found that the influence of PBC on intention moderate (B= 0.20). In our study results shows that PBC has a statistically significant direct effect, but as it stated by Randall (1991), this effect is little. Guo et al. (2007) explained these different results as follows; "For behaviors that were highly controllable, the difference between TRA and TPB was slight; however, for behaviors that were not fully voli-tional, TPB was significantly better than TRA to predict behaviors by adding PBC". The accountants do not have total control in IT usage; but it is IT dependent profession, and it cannot be performed without IT. Professional necessities force the accountants to use IT. Because of this characteristic of accountancy, we could state that accountants' volitional control on IT usage is high.

In addition, both TRA and TPB models show the predictive power for intention towards IT usage behavior

Table 5. Coefficients (a).

Model		Unstandardized Coefficients		Standardized coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1.056	0.141		7.509	0.000		
	Attitude	0.786	0.032	0.765	24.811	0.000	1.000	1.000
2	(Constant)	0.875	0.143		6.100	0.000		
	Attitude	0.689	0.038	0.672	18.297	0.000	0.677	1.478
	Subjective Norm	0.143	0.032	0.165	4.502	0.000	0.677	1.478
3	(Constant)	0.728	0.156		4.668	0.000		
	Attitude	0.679	0.038	0.661	17.980	0.000	0.667	1.499
	Subjective Norm	0.138	0.032	0.159	4.347	0.000	0.673	1.485
	Perceived Behavioral Control	0.052	0.022	0.071	2.322	0.021	0.958	1.044

Dependent Variable: Intention.

of accountants. However, stepwise regression analysis (Table 5) revealed that the TPB model has more predictive power than TRA Model; because PBC, the additional variable of TPB, is included model as a best variation that predicts the accountants' intention towards IT usage behavior. This finding provides support for the previous comparative meta-analyses such as; Armitage and Conner (2001); Madden et al. (1992); Chang (1998); Albarracin (2001); Sheeran and Taylor (1999); Hansen et al. (2004); Martin et al., (1999); Guo et al. (2007); Kuo and Young (2008); Ryu et al. (2003).

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