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Impact of individualism and collectivism over the individual's technology acceptance behaviour: A multi-group analysis between Pakistan and Turkey

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Abstract

Purpose – The purpose of this paper is to develop an extended model of technology acceptance to include behavioural beliefs (perceived usefulness and perceived ease of use), subjective norms, management support (at institutional and governmental levels) to examine the academics' internet acceptance behaviour within the Pakistan and Turkish context. In addition to this, impact of cultural dimension individualism-collectivism (IC) is also examined on the basis of moderator construct.

Design/methodology/approach – Data were collected from 380 academics' using a cross-sectional survey. Data were analysed using structural equation modelling (partial least squares) in conjunction with multiple group analysis.

Findings – The results revealed that proposed model achieved acceptable fit with the data (i.e. $R^2 = 39$ per cent in intention) and most of the hypothesised relationships were supported. The results also revealed that culture showed a moderating effect on hypothetical relationships. Specifically, the effects of management support were stronger for the respondents having high on collectivist society (i.e. Pakistan).

Originality/value – The study is useful in non-western cultural contexts. Specifically, in contrast to previous studies, diversity of individuals' acceptance behaviour is examined in Turkey and Pakistan. Additionally, this study had examined moderating impact of cultural dimension (i.e. IC) over academic's behavioural intention to accept the internet technology.

Keywords Culture, Technology acceptance, TAM, Structural equation modelling, Individual-level culture, Individualism/collectivism

Paper type Research paper

1. Introduction

Over the past three decades, there has been a growing demand for information technology (IT) and specifically internet services in small-medium and large multinational organisations. Organisations seem to be compelled to invest a significant amount of capital into IT and internet services. In turn, IT and the internet enable these organisations to remain connected with their global counterparts and perform daily operations ranging from the routine to the tactical (Srite and Karahanna, 2006; Alsajjan and Dennis, 2010; Kaba and Osei-Bryson, 2013; Nistor *et al.*, 2014). Realising the

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importance, according to the US Department of Commerce's census, 50 per cent of new capital investment is now being allocated to IT research and implementation projects (Westland and Clark, 2000). As a result, IT and the internet are considered to be a key contributor to economic growth (e.g. Morris *et al.*, 2005).

Despite of such investment in IT, in efforts to apply new IT innovations, a number of projects are still being reported as failures. Landauer (1995) reported that in the USA, about half of the IT systems implemented are either underused or have not been used at all. One of the reason researchers within information system suggested individuals' inherent perceptual behaviour, which might appear differently across the cultures (e.g. Straub *et al.*, 1997; Karahanna *et al.*, 2005; Srite and Karahanna, 2006; Dinev *et al.*, 2009; Li *et al.*, 2009; Yoon, 2009; Abbasi *et al.*, 2011; Lee *et al.*, 2013) and/or across the personal characteristics (e.g. Agarwal and Prasad, 1999; Venkatesh and Morris, 2000). Morris *et al.* (2005, p. 96) proposed that, for successful IT implementation, project managers must prioritise individuals' needs and expectations over and above the system designers.

For examining the individuals acceptance behaviour most of the studies within institute support (IS) are still relying upon technology acceptance model (TAM) suggested by Davis *et al.* (1989). It is worth to report that, generally, studies based on the TAM or its conceptualisations are restricted to North America and Western countries and, more specifically, to a single country such as the USA (e.g. Venkatesh and Morris, 2000; Venkatesh *et al.*, 2004), which limits their generalisablity across the cultures (e.g. Straub *et al.*, 1997; Parboteeah *et al.*, 2005; Teo, 2010; Tarhini *et al.*, 2014a). One of the examples can be seen from the study of Straub *et al.* (1997) who examined the TAM in the context of three countries, i.e., Japan, Switzerland and USA, and found similar variance ($R^2 = 10$ per cent) explained in behavioural usage in the US and Swiss sample but very different variance in the Japanese sample context, i.e., only 1 per cent. The results of Straub *et al.* (1997) were expected because Davis *et al.* (1989), at the time of the TAM development, did not considered cultural bias within the model. Another limitation of the TAM or models based on its conceptualisations is reported in terms of sample selection (i.e. students) (e.g. Taylor and Todd, 1995a; Bagozzi, 2007; Abbasi *et al.*, 2010). Recognising these two limitations, a few notable studies have been carried out outside the USA and different from the student sample, such as: internet banking (e.g. Shih and Fang, 2004; Chandio *et al.*, 2013; Sharma and Govindaluri, 2014), broadband internet use and adoption (e.g. Oh *et al.*, 2003; Abbasi *et al.*, 2013; Tarhini *et al.*, 2013) and healthcare and (e.g. Wu *et al.*, 2007), e-learning (e.g. Sharma and Chandel, 2013; Teo *et al.*, 2014; Al-Gahtani, 2014). Surprisingly, these studies were limited to examining the difference at the mean difference of culture computed by Hofstede (1980) 30 years ago (Abbasi *et al.*, 2013). In addition to this, as far as the authors are aware, factors influencing the decision to accept technology within higher educational institutes (i.e. academics sample) of the developing country (Pakistan and Turkey) have not yet attracted the attention of the research community. Furthermore, to the best of the authors' knowledge, there are no previous studies that compare technology acceptance in Turkey and Pakistan.

Importance of academics taken as sample can be well understood from the theory of diffusion innovation suggested by Rogers (1995). According to the Rogers (1995) innovators are most likely higher on education (in our case academics working in higher educational institutes) and possess more a favourable attitude towards risky decisions to accept new technologies. Rogers argument was supported by Agarwal and Prasad (1999) who found a positive relationship between educational level and TAM's construct perceived ease of use (PEOU). In similar line, Burton-Jones and Hubona (2006)

found a positive effect of education on TAM's construct perceived usefulness (PU) with the argument that education increased PEOU, which in turn reduced anxiety and improved overall attitude in terms of usefulness.

Given the gaps above, this study contributes to develop the model of technology acceptance by incorporating direct social pressure in terms of normative beliefs and management support on academics behavioural intention. In addition validity of the model is examined within the cultural dimension of individualism and collectivism (IC) proposed by Hofstede (1980) and evaluated by Dorfman and Howell (1988) at an individual level.

2. Hypotheses development

The framework (Figure 1) is consistent with the TAM (Davis, 1989; Davis *et al.*, 1989), theory of reasoned action (TRA) (Fishbein and Ajzen's, 1975), UTAUT (Venkatesh *et al.*, 2003) and Hofstede's (1980) theory of national culture. We adopted TAM as foundation of our model due to TAM's consistent explanatory power, i.e. 40 per cent since creation (Venkatesh and Bala, 2008). Despite the fact that the TAM has a parsimonious structure and good explanatory power across time, population and context, it is criticised due to its presupposition of examining the effect of external variables only through the mediation effect of the beliefs' PU and PEOU (e.g. Venkatesh and Bala, 2008). In order to overcome such a limitation, impact of normative belief, i.e. subjective norms (SN), as a direct determinant of intention is incorporated into the framework from the TRA. Furthermore, social influence that can be exerted subject to the culture and specific interpersonal agreements (Thompson *et al.*, 1991) on acceptance behaviour is incorporated from UTAUT. More specifically, the effect of social influence on the belief PU and the outcome behaviour intention (BI) in the present study is conceptualised with the belief management support, which is further categorised into two beliefs: government support (GS) and IS. Finally, for contributing to the literature by examining the impact of culture on the model of individual's acceptance behaviour, the cultural dimension IC is incorporated as moderator from the cultural theory of Hofstede (1980).

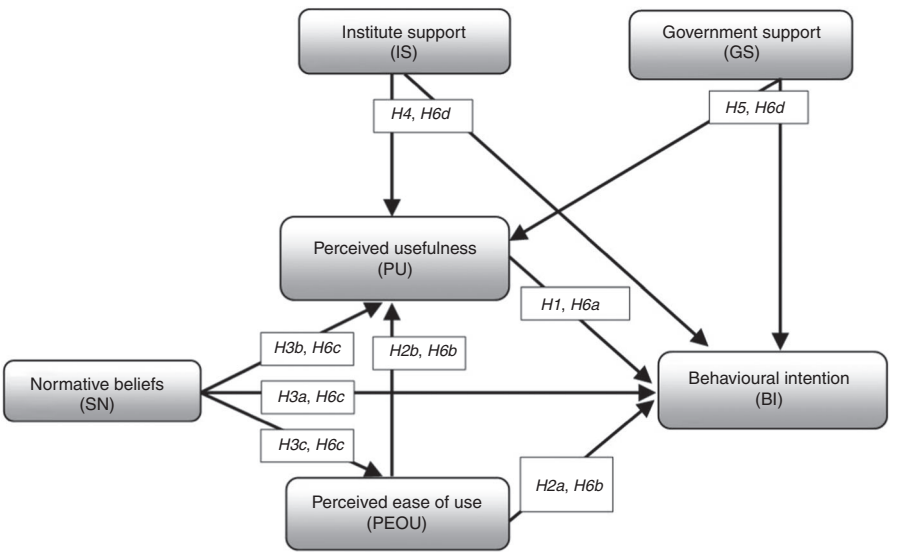

Figure 1.
Research model

Cultural dimensions of Hofstede's model over other cultural models, such as Hall (1989) and Trompenaars and Hampden-Turner (1998) were taken into examination due to number of reasons. For instance, aim of the present study was to examine the impact of culture at individual level acceptance behaviour, whereas Trompenaars and Hampden-Turner's (1998) model was developed to examine cultural dimensions at organisational level. Furthermore, Trompenaars and Hampden-Turner's model were more complex (seven dimensions each categorised into two parts) to examine compared to Hofstede's one (only four dimensions). Similarly, Hall's (1989) model were only developed to examine differences in terms of low vs high time, context and space. Hall's model would be suitable if aim of the present study would be to examine the acceptance level at cross-cultural level. The beauty of Hofstede's model is that it not only explains the differences at national level but also at professional, organisational and group level (Hofstede and Hofstede, 2005). Final reason for adopting Hofstede's model over other is its wide range of acceptance across the diverse research contexts. According to Ford *et al.* (2003), Hofstede's (1980) original work has been cited more than 1,700 times on social science citation index.

2.1 Direct relationships

2.1.1 Behavioural beliefs. Within TAM, Davis *et al.* (1989) examined the direct impact of two beliefs PU and PEOU on BI. According to the authors, intention (i.e. BI) to accept the technology is strongly influenced through the beliefs PU and PEOU (Davis *et al.*, 1989). In addition, PEOU is reported as a direct determinant of PU (Adams *et al.*, 1992). The effect of the external beliefs in the TAM over BI are theorised only through the mediation effect of PU and PEOU (Davis *et al.*, 1989).

According to the Davis *et al.* (1989, p. 320), PU is defined as "the extent to which a person believes that using technology will enhance his/her job performance". PU has been studied as an analogous construct of relative advantages in model innovation diffusion theory (IDT), extrinsic motivation in the motivational model, outcome expectation in social cognitive theory and performance expectancy in UTAUT (see Venkatesh *et al.*, 2003). Whilst, PEOU is opposite of construct complexity in IDT and similar to the effort expectancy in UTAUT (Venkatesh *et al.*, 2003). Davis (1989, p. 320) defined PEOU as "the degree to which a person believes that using a particular system would be free of effort". Adams *et al.* (1992) and Mathieson (1991) replicated the study of Davis *et al.* (1989) and found that PEOU explained a significant amount of variance in PU and, in turn, both PEOU and PU contributed to behaviour. Support of the similar relationships is persistently recognised by a number of studies in information systems research. For example, various studies (Taylor and Todd, 1995a, b; Venkatesh and Davis, 1996; Venkatesh and Morris, 2000; Venkatesh, *et al.*, 2000; Šumak *et al.*, 2011; Ezzi, 2014; Gangwar *et al.*, 2014, 2015; Kapoor *et al.*, 2014) validate the significant contribution of PEOU and PU on BI; and other studies (Taylor and Todd, 1995a; Wu *et al.*, 2007; Park, 2009; Abbasi *et al.*, 2011; Akhtar *et al.*, 2014; Teo, 2014) validate the effect of PEOU on PU. Therefore, we propose the following hypotheses:

H1. Predicts that PU will be positively related to the BI of the technology acceptance.

H2a. Predicts that PEOU will be positively related to the BI of the technology acceptance.

H2b. Predicts that PEOU will be positively related to the PU of the technology acceptance.

2.1.2 Normative beliefs. Normative beliefs, which are defined as "a person's perception to perform or not perform particular behaviour in question" (Fishbein and Ajzen, 1975, p. 302), were introduced first into the TRA. Later in the TPB, Ajzen (1991, p. 188) conceptualised it with SN, which are defined as "the perceived social pressure to perform or not perform the behaviour". Davis (1986) in the initial conceptualisation of the TAM incorporated SN, but in the final model (Davis *et al.*, 1989) omits it, mostly because of methodological reasons, and partly due to the insignificant contribution towards BI. Although the exemption of normative beliefs from the TAM has remained a topic of debate (e.g. Srite and Karahanna, 2006; Taylor and Todd, 1995b; Davis *et al.*, 1989), researchers (e.g. Venkatesh and Morris, 2000; Hartwick and Barki, 1994) with a persuasive assumption acknowledged that an individual's attitude, beliefs and behaviour cannot be learned without considering the social context/environment of which one is a member. Appreciating the importance, Venkatesh and Davis (2000) added SN as part of the TAM and found significant impact on both BI as well as on PU. Apart from that, the importance of normative beliefs in the information systems acceptance domain can be observed from its inclusion as a key determinant of intention and/or behaviour in the models TRA, TPB, DTPB, TAM2 and A-TAM as SN, in the model IDT as image, and in the model UTAUT as social influence (cf. Venkatesh *et al.*, 2003).

Unlike behavioural beliefs, empirical evidences supporting the roles of SN presented inconsistent relationship towards BI (e.g. Shih and Fang, 2004; Lin, 2007; El-Haddadeh *et al.*, 2012; Tarhini *et al.*, 2014b) conditioned to the some moderating factors, e.g. age, training, gender, experience and voluntariness. For instance, some scholars (e.g. Hu *et al.*, 2003; Taylor and Todd, 1995a; Venkatesh and Davis, 2000; Hartwick and Barki, 1994; Abbasi *et al.*, 2010; Park *et al.*, 2012; Rauniar *et al.*, 2014; Wang, 2014) found a significant impact, but on the contrary, others (e.g. Mathieson, 1991; Taylor and Todd, 1995b; Lewis *et al.*, 2003; Shih and Fang, 2004) did not find any significant impact of SN either on PU or on BI. In this study we have tapped, normative beliefs as situational variable (Venkatesh and Davis, 2000) which may get influenced by the opinion of friends, family, colleagues, peers and social group. For the clarification of ambiguous and un-revealed relationship between SN, BI and behavioural beliefs (PEOU and PU), we expect that stronger social influence will result in making internet acceptable within educational institutes setting. Therefore, we propose the following hypotheses:

H3a. Predicts that SN will be positively related to the BI of the technology acceptance.

H3b. Predicts that SN will be positively related to the PU of the technology acceptance.

H3c. Predicts that SN will be positively related to the PEOU of the technology acceptance.

2.1.3 Management support. It is generally observed that new IT systems introduced in the work environment bring about changes in work places. The changes in work places as part of introducing new system are met with resistance in some case (Yoon *et al.*, 1995). Reasonably, several studies reported the role of management support to be one of the key determinants in the IT acceptance literature (e.g. Igbaria, 1994; Igbaria *et al.*, 1997; Lewis *et al.*, 2003; Venkatesh and Bala, 2008; Tarhini *et al.*, 2013).

In this study, it is expected that management influence is based on the personal characteristics possessed by an individual and may vary according to organisational

culture and hierarchical level (e.g. Lewis *et al.*, 2003; Leonard-Barton, 1987; Delone, 1988). In terms of hierarchy, Leonard-Barton (1987) warned that, without observing management support at an appropriate level in the organisation, it will not be effective in predicting technology acceptance behaviour. Recognising the importance of hierarchy present study intends to examine the management support at top-level (GS) and low-level (IS) in terms of commitment (i.e. through the mechanism of message passing or awareness Orlikowski, 1992), general support and specific support (i.e. through the mechanism of physical support Chakrabarti, 1974). It is expected that individuals will be equally influenced by the attitudes of GS and IS. Indeed, their daily or short-term cognitive behaviour is expected to be influenced by the support from the institutional-level management depending on the provision of computers, training and internet access, whilst their long-term sustained cognitive behaviour is expected to be influenced by the support of government in terms of funding allocation, encouragement and motivation through normative and instrumental reward. Therefore, consistent with the previous literature which points to the influence of external and internal psychological constructs on technology acceptance (Lewis *et al.*, 2003; Igbaria, 1994; Igbaria *et al.*, 1997) and with the assertion of Igbaria *et al.* (1997), that management is relevant to greater system success whilst a lack of it is considered to be a barrier, it is expected that:

H4. Predicts that low-level management, i.e. IS, will be positively related to the PU and BI of the technology acceptance.

H5. Predicts that high-level management, i.e. GS, will be positively related to the PU and BI of the technology acceptance.

2.2 Moderating relationships (IC)

IC refers to the extent to which one perceives the relationship between one's self and the group of which one is a member (Hofstede, 1980). In individualist (IND) culture, people tend to be more self-conceived and prioritise their own interest above others (i.e. members in the same group or the organisation's interest). Conversely, an individual in a collectivist (COL) culture believes that one's self-identity is dependent upon the group's identity (Hofstede, 1980).

As in IND cultures, personal goals are more important than the collective, therefore individuals in these cultures are expected to be influenced by the belief PU. In contrast, in COL cultures, where individuals' decisions to accept something is based on the group's decision, it is expected that individuals in these cultures will be influenced by the normative beliefs (SN), management support (GS, IS) and the belief PEOU. The position of this argument can be understood from the meta-analysis of Bontempo and Rivero (1990) who reported that an individual's behaviour in IND is more closely related to the attitude and its antecedent (i.e. PU), and an individual's behaviour in COL is more closely related towards norms (i.e. SN). Further exploration can also be understood from the basic conceptualisation of the beliefs. For instance, in terms of PU which is one's subjective probability to view the usefulness of technology for self-interest can only be favoured by the individualist. Rationally, within a COL society, subjective probability is related to groups (McCoy, 2002) which can favour the normative belief but not the belief PU (see also Parboteeah *et al.*, 2005). Additionally, normative beliefs and management support that are the perceptions of one's decision based on others' will can be expected to be higher in COL culture, as one is highly compliant with priorities of group values.

From the perspective of PEOU (i.e. can be improved with the facilitation conditions, e.g. resource facilitation, technology facilitations, etc.) it will be more relevant to the COL culture. This rationale is consistent with Hofstede's (1980) argument which posits that within the working environment, collectivism is associated with training, physical conditions and use of skills. The rationales presented to conceptualise the IC are also supported in information system literature (e.g. McCoy *et al.*, 2005, 2007; Srite and Karahanna, 2006; Pavlou and Chai, 2002; Choi and Geistfeld, 2004; Parboteeah *et al.*, 2005; Sánchez-Franco *et al.*, 2009; Udo *et al.*, 2012). Therefore, we propose the following hypotheses:

H6a. Predicts the stronger effect of PU on BI for the IND individuals compared with the COL individuals.

H6b. Predicts the stronger effect of PEOU on PU and BI for the COL individuals compared with the IND individuals.

H6c. Predicts the stronger effect of SN on PEOU, PU and BI for the COL individuals compared with the IND individuals.

H6d. Predicts the stronger effect of GS and IS on PU and BI for the COL individuals compared with the IND individuals.

3. Method

Using a survey questionnaire, primary data were gathered simultaneously in Pakistan and Turkey in the end of 2012. Reasons for selecting these two countries were based on the two assumptions: both are similar in terms of religion (i.e. Islam) and both countries are sharing different culture based on dimensions proposed by Hofstede (1980). According to the Hofstede and Hofstede (2005, p. 175), religion have high impact on cultural dimensions masculinity/femininity (MAS), such that cultures high on masculine are more religious than cultures low on feminine. Similarly authors drawn relationship between MAS and IC and found that cultures higher on MAS were also higher on IC. Looking at this argument, it is surprised to see that even both Pakistan and Turkey are strong Muslim countries but their scores on Hofstede and Hofstede (2005) scale were very different. For instance, on IC, Pakistan scored 14 (high COL society) and Turkey scored 37 (moderate COL society); whereas, on MAS, Pakistan scored 50 (moderate on masculinity) and Turkey scored 45 (moderate but lower than Pakistan on masculinity). Therefore, unlike previous studies which examined acceptance behaviour based on mean scores of culture, it was needed to re-examine the Hofstede's cultural dimension and its effect of academics acceptance behaviour.

A total of 935 questionnaires were randomly distributed across the academics working in higher education institutions in both countries. Respondents were asked to complete the survey based on their internet usage experience within a universities context only (i.e. excluding experience of their personal usage outside the university environment). Out of 405 (i.e. 43 per cent) returned questionnaire, 25 were discarded due to missing data and outliers, and remaining 380 responses (i.e. 40.6 per cent) were taken for final analysis. Where possible validated items operationalised in prior research were modified according to the context of the study. The five items of PU, four items of PEOU and four items of BI were measured using a scale adapted from Davis *et al.* (1989) study. Six items of SN (four representing peer influence (PI) and the remaining two superior influences (SI)) and ten items of management support (five for each GS and IS) were derived from the work of Lewis *et al.* (2003). Finally, IC dimension of culture were measured on six items from the Dorfman and Howell (1988) scale.

Due to self-reported questionnaire, single method of study (i.e. survey), single set of respondents (i.e. academics) and single point in time (i.e. cross-sectional study) the possibility of common method variance were examined using Harmen's single factor test and Lindell and Whitney's partial correlation tests (Podsakoff *et al.*, 2003). Harmen's method was applied using principal component factor analysis. Results evidences that general construct accounted very little variance (i.e. 17 per cent) which was quite lower than threshold value (i.e. 50 per cent). Similarly, Lindell and Whitney's (2001) method was applied using partial least squares (PLS). Results revealed that theoretically unrelated construct (i.e. marker variable) represented very low correlation (i.e. 0.083) which was even less than 1 per cent. Both of the common method biasness tests confirm that results were not inflated due to the high correlations.

4. Data analysis

The relationships presented in Figure 1 were examined using component-based structural equation modelling with the help of PLS method. There were two reasons to use PLS as analytical method i.e. first, mostly, covariance-based measurement approaches such as LISREL and AMOS limits to examine the moderating effect due to their inherent assumptions (Helm *et al.*, 2010, p. 516) and second, growing interest of researchers to adopt PLS approach as means of statistical analysis, e.g., only in marketing research more than 30 academic articles published into ABI/Inform, Elsevier ScienceDirect, Emerald Insight have used PLS for data analysis (cf. Henseler *et al.*, 2009).

MPLS Smart Version 2.0.3 (Christian *et al.*, 2005) was used to analyse the data. This study adopted the recommended two-step approach to evaluate the model fitting with the data (i.e. measurement model) and path analysis (i.e. structural model) (Chin, 1998; Anderson and Gerbing, 1988). All of the constructs were modelled using a reflective manner and the paths' significances were determined using *t*-statistics with 200 times bootstrapping technique. Using multiple group analysis (MGA), moderator IC was examined by splitting the data-sample into subsamples (i.e. Pakistan vs Turkey), and the same PLS model was run for both subsamples (Chin, 1998). The differences between the paths estimators were tested by the significance of *t*-test suggest by Chin (2002):

$$t = \frac{b^{(1)} - b^{(2)}}{\sqrt{\frac{\left(n^{(1)}-1\right)^2}{n^{(1)}+n^{(2)}-2} se\left(b^{(1)}\right)^2 + \frac{\left(n^{(2)}-1\right)^2}{n^{(1)}+n^{(2)}-2} se\left(b^{(2)}\right)^2} x \sqrt{\frac{1}{n^{(1)}} + \frac{1}{n^{(2)}}}}$$

where $b^{(1)}$ = path value in group 1, $b^{(2)}$ = path value in group 2, $n^{(1)}$ = sample size in group 1, $n^{(2)}$ = sample size in group 2, Se = standard error.

This would follow at *t*-distribution with $m+n-2$ degree of freedom. Where m = subsample 1, and n = subsample 2.

4.1 Step1: assessment of the measurement model

The measurement is used to assess the extent to which observed variables are loaded into their underlying constructs (Chin, 1998). In other words, it is the measure of convergent and discriminant validity (Hair *et al.*, 2010). Given that, using confirmatory factor analysis, Tables I-III revealed that all of the criterions for the measurement model were fitted within the acceptable ranges. For instance, Table I shows that the indictors' reliability, also known as factor loading, exceed 0.7 (i.e. $\cong \sqrt{0.5}$) and cross-loadings were lower than the 0.4, which satisfied the item-level convergent and

Construct	Items	BI	GS	IS	PEOU	PU	SN
Behaviour intention (BI)	BI1	*0.683*	0.078	0.201	0.150	0.276	0.085
	BI2	*0.803*	0.142	0.115	0.149	0.340	0.165
	BI3	*0.742*	0.202	0.131	0.127	0.270	0.167
	BI4	*0.743*	0.104	0.162	0.242	0.311	0.171
Government support (GS)	GS1	0.188	*0.772*	0.051	0.186	0.177	0.158
	GS2	0.075	*0.784*	0.094	0.087	0.195	0.124
	GS3	0.190	*0.771*	0.152	0.095	0.218	0.176
	GS4	0.082	*0.763*	0.054	0.151	0.180	0.177
Perceived ease of use (PEOU)	PEOU1	0.204	0.167	0.151	*0.857*	0.338	0.125
	PEOU2	0.189	0.128	0.036	*0.885*	0.298	0.167
	PEOU3	0.181	0.117	0.167	*0.770*	0.297	0.155
	PEOU4	0.167	0.135	0.202	*0.777*	0.327	0.187
Subjective norms (SN)	SN1	0.157	0.137	0.128	0.166	0.230	*0.747*
	SN2	0.093	0.169	0.031	0.103	0.176	*0.669*
	SN3	0.197	0.160	0.115	0.145	0.258	*0.742*
	SN1	0.113	0.142	0.058	0.137	0.240	*0.753*
Perceived usefulness (PU)	PU1	0.338	0.214	0.231	0.276	*0.750*	0.242
	PU2	0.356	0.225	0.252	0.246	*0.756*	0.228
	PU3	0.301	0.234	0.224	0.294	*0.810*	0.246
	PU4	0.244	0.134	0.187	0.301	*0.709*	0.213
	PU5	0.235	0.091	0.169	0.307	*0.650*	0.240
Institute support (IS)	IS1	0.135	0.120	*0.795*	0.136	0.221	0.077
	IS2	0.097	0.116	*0.738*	0.119	0.200	0.030
	IS4	0.185	0.071	*0.753*	0.115	0.257	0.081
	IS5	0.196	0.034	*0.720*	0.140	0.191	0.023

Table I. Outer/factor loading (item italic) and all others are cross-loadings

	AVE			Composite reliability (ICR)			Cronbach's α		
	Total	Turkey	Pakistan	Total	Turkey	Pakistan	Total	Turkey	Pakistan
BI	0.55	0.55	0.56	0.83	0.83	0.84	0.73	0.72	0.74
GS	0.59	0.48	0.54	0.86	0.82	0.86	0.77	0.73	0.79
IS	0.57	0.54	0.52	0.84	0.85	0.84	0.75	0.78	0.78
PEOU	0.68	0.62	0.75	0.89	0.87	0.92	0.84	0.80	0.89
PU	0.54	0.55	0.52	0.85	0.86	0.85	0.79	0.79	0.77
SN	0.53	0.50	0.51	0.82	0.83	0.84	0.71	0.76	0.76

Table II. Summarised model-fitting table

discriminant validity, respectively (Henseler *et al.*, 2009; Hair *et al.*, 2010). Two items of normative beliefs (PI4 and SI2) and two items of management support (GS5 and IS3) were eliminated, due to lower standardised factor loading (< 0.4) recommended by Henseler *et al.* (2009). Table II shows that internal consistency of items towards the construct were satisfied, such that all the constructs' α and internal composite reliability were greater than 0.7 (Cronbach, 1951; Hair *et al.*, 2010). In addition, Table II shows the AVE obtained through measures of the same concept were higher than the recommended value of 0.5 and satisfied the criterion of convergent validity at construct level (Fornell and Larcker, 1981). Finally, Table III (section on the right) show that the square-root of AVE in all of the data models exceeds the inter-construct correlations and satisfied the criterion of discriminant validity at constructs level (Fornell and Larcker, 1981).

Constructs	R^2	Communality	H^2	Redundancy	F^2	BI	GS	IS	PEOU	PU	SN
BI	0.39	0.55	0.261	0.05	0.13	*0.74*					
GS		0.52	0.284			0.18	*0.77*				
IS		0.53	0.297			0.20	0.12	*0.75*			
PEOU	0.04	0.68	0.4603	0.03	0.03	0.23	0.17	0.17	*0.83*		
PU	0.27	0.54	0.3176	0.02	0.14	0.41	0.25	0.29	0.38	*0.73*	
SN		0.50	0.234			0.20	0.21	0.07	0.19	0.31	*0.73*
Average	0.23	0.56		0.04							
GoF	0.36										

Note: H^2 = Constructs cross-validate communality; F^2 = Construct cross-validate redundancy; Goodness of fit index (GoF) = $\sqrt{R^2 \times \text{average communality}}$; Discriminant validity: $\sqrt{\text{AVE}} >$ latent variable correlation

Source: Fornell and Larcker (1981)

Table III.
Goodness of fit and discriminant validity of overall model

4.2 Step2: assessment of structural model

The structural model is used to evaluate the paths established with the series of structural equations among the exogenous and endogenous latent variables (Chin, 1998). Looking at the Tables III and IV it is visible that all the criterions of the structural model were tenable at a moderate to good level. For instance, observing the R^2 value (i.e. the percentage of variation in the dependent variable(s) explained by the independent variable(s), Keil *et al.*, 2000) it is noticed that the model with the overall data set and the sub-models were accepted at a moderate level (i.e. value > 0.19 and < 0.34, Chin, 1998) in terms of the dependent variable, BI, followed by PU. Table III indicates that BI shared the highest variance ($R^2 = 0.39 \cong 40$ per cent) followed by PU (i.e. $R^2 = 0.26$ or 26 per cent) within the overall data set; whereas, in the sub-models (Table IV) the higher variance was noticed in the model with Pakistan's sample ($R^2 = 0.46$ or 46 per cent in BI) compared with Turkey's sample ($R^2 = 0.40$ or 40 per cent in BI). The shared variances extracted by the indicators in their underlying constructs presented by communalities were also higher than the 0.5 thresholds in both models (Hair *et al.*, 2010), and the redundancy were positive and well above zero (Tenenhaus *et al.*, 2005). The predictive relevance (i.e. assessment of the model's capability to predict R^2 through sample reuse/cross-validation (Stone, 1974; Geisser, 1975) were computed using blindfolding ($G = 7$ blocks). The results in Tables III and IV suggest that all of

	Turkey($n = 207$)						Pakistan ($n = 173$)			
Constructs	R^2	Communality	H^2	Redundancy	F^2	R^2	Communality	H^2	Redundancy	F^2
BI	0.40	0.55	0.27	0.04	0.11	0.47	0.56	0.27	0.07	0.15
GS		0.48	0.23				0.54	0.31		
IS		0.53	0.30				0.52	0.28		
PEOU	0.03	0.62	0.36	0.02	0.02	0.03	0.75	0.57	0.03	0.03
PU	0.27	0.56	0.34	0.03	0.13	0.30	0.53	0.27	0.02	0.14
SN		0.50	0.24				0.51	0.23		
Average	0.24	0.54		0.03		0.27	0.57		0.04	
GoF	0.36					0.39				

Note: H^2 = Constructs cross-validate communality; F^2 = Construct cross-validate redundancy; Goodness of fit index (GoF) = $\sqrt{R^2 \times \text{average communality}}$

Table IV.
Goodness of fit index of sub-groups

the models were well fitted with the data (H^2 and $F^2 < 0$ or no negative, Tenenhaus *et al.*, 2005). Finally, the GoF (i.e. geometric mean of the average communality and the average of R^2, Amato *et al.*, 2004) reveal that all of the models were accepted at a moderate level (see Chin, 1998 criterion).

In order to examine the path differences within the structural model, it is better to first review the results of cultural dimensions. Despite the fact that Hofstede's (1980) country-level scores re-measured on Dorfman and Howell's (1988) individual-level scale are logically incomparable, due to the difference between the scales. However, for comprehending whatever insights (e.g. differences) occur between the two scales, the mean scores were compared by splitting 100 indices of Hofstede with the seven point Likert score of Dorfman and Howell. Given that, seven points in the Dorfman and Howell scale were divided into 28 equal parts, such that each 0.25 represents 3.57 points in the Hofstede score (see Table V).

Thus, the mean obtained for the construct IC in terms of for Pakistan's sample was 5.40/7 and Turkey's sample was 4.31/7. These mean scores represents the score of 21-25 in Pakistan's context, and 35-39 in Turkey's context on the Hofstede scale. These score compared with original Hofstede's scale suggests that there is slightly increase towards a more individualist society in the Pakistan's context only (original on Hofstede, 1980 study it was 14). Based on these scores, in the present study, Pakistan is considered to be COL and Turkey is considered as IND society, and further results will be interpreted on such criterions. It should be noted that IC is measured on collectivism scale in Dorfman and Howell scale, whereas it was measured on individualism scale in Hofstede, therefore mean computed between two are reverse to each other (e.g. $1 = 7$ and so on).

Table VI presents the path significance in terms of variance (β) and the corresponding *t*-value of the critical ratio. The majority of the path relations without the moderation effect (i.e. overall data set) were significant, except for PEOU, SN and GS on BI. The highly significant path was between PU and BI ($\beta = 0.33$ or 33 per cent) and the least significant was between GS on PU ($\beta = 0.13$ or 13 per cent). Thus, *H1*, *H2b*, *H3b*, *H3c* and *H4* were supported, and *H5* was partially supported (i.e. the effect of GS was significant only on PU). The effect of the cultural dimension IC on the structural paths reveals that, all of the paths were in accordance with the overall data set. For examining the significant difference of the cultural dimension on the paths proposed, the bootstrap method was applied to re-sample the data to obtain the standard error of the structural paths in the subsamples. The differences between the path estimators were tested for the significance of *t*-test. The results in Table V in MGA-column show that, dimension IC produced significant differences on the proposed paths. For instance path IS→PU was significant in Pakistan (high COL) group only.

5. Discussion and implications

The results of the present study show that most of the hypothetical relationships were supported. The explained variance without the moderation effect is almost

Table V. Hofstede (1980) score compared on Dorfman and Howell (1988) scale

0.25	0.5	0.75	1	1.25	1.5	1.75	2	2.25	2.5	2.75	3	3.25	3.5
3.57	7.14	10.71	14.28	17.85	21.42	25	28.57	32.14	35.71	39.28	42.85	46.42	50
3.75	4	4.25	4.5	4.75	5	5.25	5.5	5.75	6	6.25	6.5	6.75	7
53.57	57.14	60.71	64.28	67.85	71.42	75	78.57	82.14	85.71	89.28	92.85	96.42	100

Hypothesis	Combined data set $n = 380$, Path (t-value)	Turkey ($n = 207$)	Pakistan ($n = 173$)	MGA(t-value)
SN→PU	0.219	0.187	0.295	0.928
	(3.83)***	(2.23)*	(3.67)***	
PEOU→PU	0.283	0.235	0.335	0.935
	(5.65)***	(3.10)**	(4.49)***	
GS→PU	0.133	0.150	0.089	0.581
	(2.50)*	(2.05)*	$(1.22)^{ns}$	
IS→PU	0.211	*0.103*	*0.290*	*2.159*
	(4.61)***	$(1.52)^{ns}$	(*5.19*)***	
PEOU→BI	0.024	0.036	−0.024	0.580
	$(0.43)^{ns}$	$(0.53)^{ns}$	$(0.302)^{ns}$	
PU→BI	0.337	0.367	0.332	0.383
	(6.94)***	(6.56)***	(4.489)***	
SN→BI	0.024	−0.019	0.105	1.247
	$(0.85)^{ns}$	$(0.26)^{ns}$	$(1.62)^{ns}$	
GS→BI	0.024	−0.083	0.071	1.215
	$(0.36)^{ns}$	$(0.85)^{ns}$	$(0.93)^{ns}$	
IS→BI	0.212	0.134	0.190	0.539
	(3.87)***	$(1.79)^{ns}$	(2.75)**	
SN→PEOU	0.193	0.168	0.185	0.164
	(3.90)***	(2.77)**	(2.23)*	

Table VI.
Path regression with and without moderating factors

Notes: ns, not significant. Values in brackets represent the t-value. Values in italic are the real differences computed through t-test. $t = 2.58$, $p < 0.01$; $t = 1.96$, $p < 0.05$ and $t = 1.64$. $p < 0.10$. *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$ (two-tailed)
Source: Hair *et al.* (2010, p. 390)

similar to the TAM's consistent variance (i.e. 40 per cent); however, in terms of moderation effect the difference is so clear and distinct between Pakistan and Turkey's context. Below a discussion of the results, both without and with the moderation effect of culture is presented. Within framework, behavioural beliefs PU and PEOU (*H1* and *H2b*) produced similar results withstanding to the TAM and the relevant literature (Davis *et al.*, 1989; Venkatesh and Davis, 1996); however, notwithstanding the literature an insignificant relation between PEOU and BI was observed (*H2a*). Gefen and Straub (2000) explained this insignificance with the position that new technologies are mostly welcomed due to extrinsic motivations (i.e. PU), which after some extant render the effect of intrinsic motivations (i.e. PEOU). Closely observing the results (Table VI), it is noticed that the highest significant path observed was between PU and BI, therefore at some degree an insignificance of PEOU on BI was inevitable.

As theorised, the relationships of SN on PU and PEOU (*H3b* and *H3c*) were significant, however the effect on BI (*H3a*) was insignificant. The significance of the SN on PU is in accordance with the TAM2 (Venkatesh and Davis, 2000), which posits that SN can influence BI indirectly through PU by the process of internalisation effects. The literature also supports indirectly the effect of PEOU on BI via PU (Davis *et al.*, 1992); therefore the indirect impact of SN on PU via PEOU was also to be expected in this study. The relationship of SN on beliefs suggests that the opinions of co-workers, superiors and friends can serve as an important source of influence for developing the beliefs towards acceptance intention.

The insignificant impact of SN on BI has always remained an area open to debate and further investigation. For instance, as discussed in the framework, Davis *et al.* (1989), at the time of the TAM development, decided to remove SN due to the instable methodological and insignificant contribution. In addition, the studies which found a significance of SN (e.g. Shih and Fang, 2004) were conditioned to the some moderating factors (e.g. age, gender, experience). One of the examples can be noticed from the study of Venkatesh and Davis (2000), who found that the impact of SN on BI became weaker with the passage of time and experience usage. In the current study, most of the respondents had a moderate to high usage experience (mean = 3.90/5) which they gained with the passage of time, therefore their cognitive consideration towards the intention to accept technology was based on self-reliance and experience rather than the opinion of others.

In terms of management support, impact of IS on PU and BI were completely accepted (*H4*), however, GS was only significant on PU, leaving BI as insignificant (*H5*) (Table VI). The significant impact highlights the importance of management support as a key predictor, and the lack of it as a critical barrier to acceptance and success (e.g. Yoon *et al.*, 1995; Igbaria *et al.*, 1997). Pragmatically, the significance of the relationship is consistent with the previous literature in the context of organisational support (e.g. Davis *et al.*, 1989; Lewis *et al.*, 2003; DeLone, 1988; Leonard-Barton and Deschamps, 1988) and specifically within management support towards PU and system usage (e.g. Lewis *et al.*, 2003; Igbaria *et al.*, 1997; Igbaria, 1994). The differentiated impact (IS fully supported and GS partially supported) is consistent with Lewis *et al.*'s (2003) findings, who found that individuals tend to be more influenced by their immediate supervisors (i.e. IS) due to their day-to-day communication, as compared with top-management (i.e. GS).

5.1 The moderating effect (IC)

As expected, a higher impact of PU on BI was noticed in Turkey's (i.e. IND) context (*H6a*), and the remaining, SN, PEOU, GS, IS, impact on PU and BI was noticed as higher in Pakistan's (i.e. COL) context. Despite of the fact that the impact of PU on BI is in accordance with the hypothesis, its significance in a COL culture (i.e. Pakistan) is still contrary to the literature (e.g. Bontempo and Rivero, 1990). A possible explanation may be justified with the impact of normative beliefs (i.e. reliance on others' perception) that is noticed to be higher in the COL cultures. It was reported earlier that within the COL culture, individuals tend to accept technology due to the group's perception; however, in contrast individualists are independent and as a consequence accept technology on their own. Though Turkey sample is considered compared to the Pakistan ones is IND, but in overall Hofstede (1980) study both countries are treated as COL (i.e. < 50 score). The present study sample tends more towards a COL culture, therefore finding an insignificant effect of PU on BI seems not to be viable.

The test of moderation significance shows that the two groups were different at path IS→PU; specifically, the path was significant in the Pakistan's (high COL group) and insignificant in the Turkey's (high IND group). This finding is consistent with the results of McCoy *et al.* (2005) and suggests that individuals within the high COL group were more influenced by the management support at an institutional level. This explanation can also be understood from the literature (e.g. Srite, 2006; Srite and Karahanna, 2006; Straub *et al.*, 2002), which posits that in a COL culture individuals are more concerned about the opinion and help of others in shaping their own behaviour.

5.2 Implications for research

In terms of theory, primarily this study contributes in extending the TAM to overcome its two widely reported limitations: first, extension in the model by integrating normative beliefs and management support beyond the mediation effect of beliefs (PU and PEOU) and second, examination of cultural impact by disaggregating one dimension (i.e. IC) into two different countries. Consistent to the TAM, which posits that individuals accepts technology only if they believe it will have positive outcome (i.e. PU), the effect of SN, and GS was only significant through PU in the extended model. However, contrary to the TAM, significance of IS on BI supports conceptualisation positioned that the social influence can also play a direct impact beyond and above PU in developing acceptance intention. Overall the validity of the model can be exerted from the variance explained, i.e. 39 per cent in BI, and more than half significant hypothetical paths. Nevertheless, a 39 per cent variance implies that there can be other factors involved to increase the acceptance intention, but at the same time be considerably relative to similar variance, explained by Davis *et al.* (1989), i.e. 40 per cent corroborates the need of the extension in the model.

From the cultural perspective, contrary to the previous literature in technology acceptance that examined behaviour predominantly within North America and specifically within one single country, the USA (e.g. Venkatesh and Morris, 2000; Venkatesh *et al.*, 2004), this study not only attempted to validate the constructs of the well-established IT acceptance theories outside the North-American context, but also examined the cultural dimensions at an individual level. According to Srite and Karahanna (2006, p. 697) disaggregating culture into relevant dimensions and examination at an individual level can be generalisable to any theoretical model. The comprehensive examination of the ten path relations within using cultural dimension, split into two groups (Pakistan and Turkey) produced a total of 20 comparisons ($10 \times 2 = 20$). In addition, each difference computed for comparison using parametric *t*-statics is a principal contribution and can be used as actionable guidelines in the literature pertaining to exploring cultural differences. The results in this study indicate that an examination of culture showed a significant difference on relations of a TAM. For instance, in terms of variance explained, a clear difference was noticed between two countries, e.g. Pakistan = 46 per cent and Turkey = 40 per cent in BI. The difference in the variance raises the question about the external validity of the TAM's constructs, and confirms the argument positioned in the study regarding the cultural bias within the TAM.

5.3 Implications for practice

The results obtained from the present study can have several practical implications. For instance, from the perspective of the model extension (i.e. inclusion of the direct effect of normative beliefs and management support) the results suggest that management support influences behaviour directly and indirectly through its influence on the belief PU. The strong mediating impact of PU on BI suggests that individuals are likely to accept technology because of the functions it performs (i.e. relative advantages). The importance of PU can also be noticed from the insignificance of PEOU on BI. This suggests that no matter that the technology was difficult to use, still individuals were willing to accept it just because of its functionality. Therefore, management needs to emphasise specifically on the functionality of the technology and convey awareness realistically about the purpose and outcome of the technology. This awareness can be conveyed easily through the support of colleagues working in

organisation and management at a local level (i.e. SN and IS showed a significant impact in the study).

From the cultural perspective, the findings of the current study suggest that social influence does matter within distinct cultural groups, whether in the form of normative beliefs or in management support. For example, individuals higher on COL (i.e. Pakistan), gave a higher importance to SN (i.e. $\beta = 29$, 10 and 18 per cent) and management support at the IS level (i.e. $\beta = 29$ and 18 per cent) to establish the BI through the PU. Based on the moderation effect management can devise strategies to improve the acceptance behaviour with the help of colleagues and local management. This may include, but is not limited to, the provision of group training programmes, structured learning opportunities within groups, the availability of resources at a local organisational level and sharing the future commitment and vision of technology through local management, colleagues and peers.

6. Limitations and future research

Finally, as with any other research, our study has some limitations that must be addressed in future research. First, this study limits in eliciting the mediation effect of the basic beliefs PEOU and PU on acceptance intention. Measuring the mediation effect would enable the obtaining of more rigorous results. For instance, in the present study it was observed that PEOU was only significant on BI when individuals perceived the importance of PU only. Thus, the PU played an important substantive role in predicting BI. Similarly, the impact of GS→PU and IS→PU was also significantly related to the BI, and SN→PEOU was also related to the PU. All of these indirect effects raise the questions about the validity of the mediation effects on the beliefs as proposed in the original TAM (Davis *et al.*, 1989).

The second limitation of this study is related to the cross-sectional design that can only support the associations but not the causal explanations. In studying IT acceptance, the importance of a longitudinal study is highly emphasised (e.g. Davis *et al.*, 1989), specifically when factors are sensitive to time and experience (Venkatesh and Morris, 2000). For example, Venkatesh and Davis (2000) found that the impact of SN on BI became weaker with the passage of time and experience. Given that the extended model in the present study is originated from behavioural theories of acceptance (e.g. TAM and TRA) which requires continuous feedback from the context under investigation, but is however, not being examined using a longitudinal study.

7. Conclusion

The research presented here was motivated by the overstated impact of culture and omitted social influence (normative as well as management influence) as a direct determinant of behavioural intention within the models of technology acceptance. To this end, an extended model of technology acceptance was developed and employed over less explored sample (i.e. academics working in higher educational institutes) to overcome the limitations. The overall variance explained by the model was relatively similar to the original TAM which validates the extension; however, out of three path relations (representing direct impact of social influence) the insignificance of two is still alarming validity of the model. From moderation, the results indicate that culture manifested varied impacts on individuals' acceptance behaviour. Specifically, normative beliefs were highly recognised in respondents who were COL (i.e. Pakistan) on cultural characteristics. The findings of this study set the grounds for future researchers to see the interplay between culture and individuals acceptance behaviour.

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