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## A generalised adoption model for services: A cross-country comparison of mobile health (m-health)

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### ABSTRACT

Which antecedents affect the adoption by users is still often a puzzle for policy-makers. Antecedents examined in this research include technological artefacts from the Unified Theory of Acceptance and Use of Technology (UTAUT), consumer context from UTAUT2 and psychological behaviour concepts such as citizens' channel preference and product selection criteria. This research also investigated cultural domination on citizens' behavioural perception. The data for this study was collected among citizens from three countries: USA, Canada, and Bangladesh. The findings suggest that the UTAUT model could partially shape technology artefact behaviour and the extended UTAUT must consider specific determinants relevant to cognitive, affective, and conative or behavioural aspects of citizens. The model helps policy-makers to develop mobile healthcare service system that will be better accepted. The finding also suggests that this mobile service system should reflect a country's cultural traits. These findings basically extend the theoretical concept of UTAUT model to articulate adoption behaviour of any complex and sensitive ICT related issues like mobile healthcare system.

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### 1. Introduction

Starting from the last century, substantial advancement and revolutionary accomplishment of the health-care service system helped citizens to create enormous expectations in identifying and accepting new health-care services (Kahn, Yang, & Kahn, 2010; Kim, 2012; Weiner, 2009). Citizens, as an essential, precious, and emergency product, demand health-care services to be flexible, accessible, available, and compatible with a maximum price-value trade-off. They also prefer to streamline their enormous expectation for cost-effectiveness, quality, efficiency, and life-pattern-congruency from health professionals (Wu, Wanga, & Lin, 2007). Countries like the USA and Canada have taken initiatives to implement electronic and mobile health recordings, the UK and Sweden have introduced global positioning systems (GPS) in monitoring ambulance schedules, and the Netherlands have experimented with a wireless network in communicating an emergency trauma care system (Geier, 2006). There was a contemporary urge for restructuring the health-care service delivery pattern by keeping it consistent and congruent with a mobile, dynamic, and flexible lifestyle of an ICT-driven and dominating society which appealed to health professionals

and ICT consultants to design and implement a mobile health-care service system professionally; it's 'buzzed' as mobile-health or m-health.

The central concept of this system lies in the underlying paradigm which refers to offering the right health-care system to the right patients continuously at any time and any place; even keeping regular daily life activities through remote wireless communications as well as modern ICT-related technological equipment (Shareef, Kumar, & Kumar, in press). The typical communication of m-health is the following: any RFID equipment with different sensors capable of measuring different physical changes of the patients, and location identifiers that can be used by the patients. This equipment may be worn as a wrist band, embedded in living spaces, or implanted in the body (Halpern et al., 2008). With integrative software support, the patient's smartphone continuously monitors, records, analyses, alerts, and communicates with both patient and hospital professionals from a remote place. Medical professionals are connected with the smartphone of the health-care service receiver by laptop, tablet PC, PDA, or other wireless-based Internet communication.

Since on-the-spot health service is offered through m-health, it is a new public health service system that has been adopted across countries in the world; this study of modelling citizens' complex buying behaviour is exploratory in nature. However, strong evidence from scholarly studies and cross-cultural theories regarding cross-cultural implications for complex buying behaviour increases our intention to

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reveal the cultural impacts on the integrated health and technological adoption behaviour for citizens toward m-health. Pavlou and Chai (2002) addressed adoption behaviour for Chinese and USA citizens and, in the light of Hofstede's (2001) cultural dimensions, revealed that any attempt to formulate a standardised ICT-related citizen behaviour model is impractical.

Therefore, explicitly, the focused objective of this study is to integrate adoption behaviour for an ICT-based mobile health service that would reflect the market aspect of citizens' preferences and reveal a cross-cultural impact and differences on this intrinsic and extrinsic adoption behaviour. The study is engaged in streamlining a generalised acceptance behaviour of citizens shedding light on an integrated theory in predicting citizens' preferences and further exploring any plausible differences in antecedent beliefs reflecting dissimilarities in cultural traits. The authors investigated the behaviour among citizens of three countries: namely, the USA, Canada, and Bangladesh which have predominant and conclusive differences in cultural traits according to Hofstede (2001).

The reminder of this submission is structured as follows: the next section will briefly present theoretical concepts such as adoption behaviour and citizens' preference and cross-cultural effects relevant to the topic examined in this submission. This is then followed in Section 3 by a detailed discussion on development of a conceptual model and hypotheses formulation as a basis for undertaking empirical work. Section 4 then provides a detailed account of the research methodology utilised, scale development, sample selection and data collection. The results from the empirical analysis are presented and discussed in Section 5. A detailed discussion follows on the theoretical and practical implications in Section 6. Finally, Section 7 presents key conclusions and briefly discusses limitations of this study and future research directions.

## 2. Theoretical concepts

### 2.1. Adoption behaviour and citizens' preference

Citizens' adoption behaviour for m-health depends on the citizens' preference to replace the old system (Shareef et al., in press). If citizens, specifically patients, using the traditional health-care service by physically moving to hospitals/clinics to get face-to-face contact with medical professionals may deem the m-health service system physically and psychologically more advantageous from any perspective; they might even create a preference for behavioural intention to adopt the mobile health-care service system – m-health. This research encompasses citizens' adoption behaviour as a continuous preference for a new system by replacing the old one by starting from awareness and familiarity of the system. Technological, behavioural, and social beliefs of the system's functional, organisational, and professional's benefits will render it congruent with a life pattern comprising of an attitude toward using it (Shareef, Kumar, Kumar, & Hasin, 2013). Finally, the intention to use it will lead to actual acceptance behaviour.

Citizens are not engaged in buying or pursuing m-health as a regular product. Its purchase frequency, oriented with only intended patients, is insignificant to general citizens (Shareef et al., in press). In the m-health service system, self-service technology is predominant which exhaustively needs self-explanatory skills. From the perspective of a health-concerned matter, m-health-related issues potentially deserve high importance from consumers in the light of usage (Yu, Wu, Yu, & Xiao, 2006). Therefore, systematic adoption of m-health manifests a complex buying behaviour, and consumers integrate several pre-occupational beliefs to justify their actual behaviour. In this type of buying behaviour, which is not relevant to and captured by the theory of mere exposure where frequency of information exposure may dictate final interaction behaviour, market researchers are interested in identifying consumers' preference which is enormously characterised by extended problem solving (Howard & Jagdish, 1969).

### 2.2. Cross-cultural effect

Posey, Lowry, Roberts, and Ellis (2010) conducted a study among British and French online users to augment and formulate their behaviour and recognised that cultural differences play a crucial role in predicting actual behaviour. From an extensive analysis of consumers' behaviour of two different cultural samples, they concluded that acceptance behaviour of consumers for any complex technology-related issues are dominantly controlled and moderated by cultural traits. Therefore, while determining adoption behaviour for consumers, researchers must consider and manifest cultural traits; otherwise, any generalised conclusions could be misleading. Donthu and Yoo (1998) analysed cultural influences on service perception among the consumers of four countries – Canada, India, UK, and USA – and noted significant differences in perceiving service quality among consumers having different cultural traits. Espinoza (1999) explored consumers' behaviour for North America and Latin America in perceiving service quality and revealed that consumers behaviour is culture bound. The author in a seminal article illustrated cross-cultural differences among consumers of Canada and Peru and remarked with reference to Mattila (1999), that consumers' perception should be determined considering cultural differences.

Winsted (1997) investigated consumer behaviour for ICT in the USA and some Asian countries and concluded that a generalised trend could be dispersed due to an impulsive effect of cultural differences. Tajfel's social identity theory (1972) identified that behavioural and social differences among cultures have potential implications on modelling consumers' behaviour.

In the light of the aforementioned illustrations, this study is attempting to conceptualise consumers' behaviour for adopting m-health considering cultural differences among consumers of the three different countries; USA, Canada, and Bangladesh.

### 3. Model development for predicting consumers' behaviour

Engel, Kollat, and Blackwell (1973) revealed consumers' decision making having five distinct stages with sequential progression such as problem recognition, information search, evaluation of alternatives, purchase decision, and post-purchase behaviour. Ives and Learmonth (1984) reconciled customer resource life cycle (CRLF) and suggested that it has three sequential advancements with pre-purchase, during purchase, and post-purchase phases. In our present study, since we are pursuing m-health adoption behaviour, governing factors of m-health adoption behaviour as an exploratory marketing concept does not essentially include post purchase behaviour in the adoption model. As adoption behaviour of m-health is a new issue in the marketing field, even a very recent topic in the ICT and wireless communication area, in the very beginning, we are attempted to synthesise some ICT related adoption behaviour of consumers from ICT and marketing literature.

Mallat (2007) studied consumers' adoption of mobile payments. The author's identification in this context is orthogonal to regular behavioural theories like the theory of planned behaviour (TPB) (Ajzen, 1991), technology adoption model (TAM) (Davis, 1989), and diffusion innovation theory (DOI) (Rogers, 1995), and identified that consumers' preference of mobile payment has a complex buying behaviour. Nevertheless, one exemplary distinction for relative advantage concept is notable which is explained as the benefits provided by time and place independent interactions to avoid waiting time (Mallat, 2007). This conceptual definition of relative advantage has certain differences from the regular construct of TAM and DOI comprising personal choice over an old one in terms of time and space benefits. Lichtenstein and Williamson (2006) investigated Australian banking consumer experiences for adoption of Internet banking. Referring to the theory of prospective gratification (LaRose, Mastro, & Eastin, 2001) and reception approaches (Cunningham & Finn, 1996) of mass media theory, the

authors proclaimed that consumers' adoption behaviour of any social system reflects both intrinsic and extrinsic motivational factors as the general trend.

Several researchers (Chen & Li, 2010; Lichtenstein & Williamson, 2006; Rana & Dwivedi, 2015; Shareef, Kumar, Kumar, & Dwivedi, 2011/2014) illustrate the same issue like Mallat (2007) that general adoption theories of social psychology like DOI, TPB, and TAM cannot predict comprehensively consumers' adoption behaviour for online-based products as consumer preference for these products is fundamentally governed by personal convenience like time, space, and flexibility advantages. Security, privacy and trust are also leading concerns of consumers for adopting online-based products and these issues are articulated by many researchers (Dwivedi, Weerakkody, & Janssen, 2012; Gefen, Karahanna, & Straub, 2003; Janssen, Chun, & Gil-Garcia, 2009; Shareef et al., 2011). Transaction cost analysis (Williamson, 1987) and switching cost theory (Burnham, Frels, & Vijay, 2003) asserted the claim that behavioural and social conveyance is a predominating factor to be included in predicting consumers' adoption behaviour for any Internet and wireless communication-based product which resembles m-health. And it is precisely this notion of this behavioural and social conveyance that has a certain acute distinction from the regular behavioural theories. Pavlou and Fygenon (2006) worked on electronic-commerce adoption behaviour in the mandatory and voluntary setting shedding light on TPB and concluded that since this type of adoption behaviour has two distinct characteristics arising from marketing and ICT settings, traditional TPB should be extended in conceiving comprehensive behaviour of online consumers. Online consumers' behavioural researchers approved this claim with similar findings (Taylor & Todd, 1995). Referring to Ba and Pavlou (2002), the authors recommended to explore extended behaviour of consumers for wireless technology (Pavlou & Fygenon, 2006).

Taylor and Todd (1995) analysed TPB for high involvement complex buying behaviour related to ICT and recognised that antecedent beliefs of behavioural intention should be decomposed to introduce relative advantage with a special setting of time and space conveniences. O'Cass and Fenech (2003) recommended similar arguments by suggesting that online adoption behaviour of consumers has a foundation on TAM, TPB and DOI. However, consumers' complex behavioural aspects indicating a series of decomposed behavioural beliefs should be incorporated to keep consumers' adoption behavioural model both parsimonious and comprehensive. This argument is supported in the study of Yoh, Damhorst, Sapp, and Laczniak (2003) which articulated technological, behavioural, and social beliefs in the integrated theory of reasoned action (TRA) (Fishbein & Ajzen, 1975) and TAM. The authors indicated that in conceiving consumers' behavioural intention pursuant to actual usage behaviour, psychological factors, social factors, and prior experience are imperative for a comprehensive prediction of behaviour. Similar attempts were undertaken by Kim, Park, and Oh (2008) for revealing consumers adoption of short message service (SMS) and by Shareef et al. (2011) for modelling online consumers' adoption for electronic-government (eGov) and both of the authors' identification explicitly indicate that TPB, TAM, and DOI cannot predict comprehensive behaviour of consumers, particularly for online adoption.

Under this circumstance, the authors looked and investigated this research shedding light on the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, Morris, Davis, & Davis, 2003) model as the unified and integrated technological base model to reflect citizens' complex behaviour for Internet and wireless telecommunication-based ICT products. However, to reflect citizens' buying preference for complex, high involvement, and self-expressive product like m-health, the authors also analysed marketing and channel preference theories to develop a generalised model, although it is governed and moderated by cultural differences among citizens.

Social and behavioural psychology, ICT, and consumer marketing literature are using several fragmented theories regarding acceptance behaviour for many years; namely, TPB, TRA, TAM, DOI, Model of PC

Utilisation (MPCU) (Thompson et al., 1991), Motivational Model (MM) (Vallerand, 1997), combined TAM and TPB (C-TAM-TPB) (Taylor & Todd, 1995) to predict consumers' adoption behaviour. Since fundamental concepts of these theories have potential congruency and to some extent have overlapping definitions of the constructs and their measuring items, researchers used these conceptual frameworks in investigating performance to predict actual acceptance behaviour, empirically tested those, and further formulated human behaviour. Theorising similar behaviour with different and scattered conceptual frameworks cannot present comprehensive paradigms of citizens' behaviour. In this light, Venkatesh et al. (2003) reviewed user acceptance literature, particularly dissected and analysed those eight prominent models named earlier, empirically compared and integrated significant and potentially contributing constructs and measuring items from those eight models and their extensions, discarded overlapping concepts, and finally formulated a unified model conceiving overall comprehensive explanatory power to conceptualise and predict citizens' acceptance behaviour. As we have remarked, we used this integrated conceptual framework to theorise adoption behaviour of citizens with a further extension for inclusion of consumers' (here patients as consumer) behaviour that was specific to m-health.

According to the UTAUT model, performance expectancy, effort expectancy, social influence, and facilitating conditions are the four significant determinants to explain user acceptance and usage behaviour.

### 3.1. Performance expectancy (PE)

Venkatesh et al. (2003) identified this formative construct of behavioural intention from the integrated epistemological and ontological paradigms of perceived usefulness (TAM and C-TAM-TPB), extrinsic motivation {MM}, job-fit (MPCU), relative advantage (DOI), and outcome expectations (SCT). These salient constructs are extracted from the mentioned eight models. The authors defined this determinant of behavioural intention as "the degree to which an individual believes that using the system will help him or her to attain gains in job performance" (Venkatesh et al., 2003, p. 447). Since m-health adoption is a personal view which occurs in a voluntary situation, and its expected outcomes constitute gain or benefit related to individual performance, the generic concept of performance expectancy is modified in this study deleting notions of achieving organisational performance for job functions. The authors explain performance expectancy for m-health as the degree to which an individual believes that using this alternative health-care system will help to attain gains in self-overall performance.

**H1.** Performance expectancy (PE) has positive influence on citizens' behavioural intention for m-health adoption behaviour.

### 3.2. Effort expectancy (EE)

This determinant of UTAUT model captured integrated notions of perceived ease of use (TAM/TAM2), complexity (MPCU), and ease of use (IDT) (Moore & Benbasat, 1991). In the light of above mentioned constructs, Venkatesh et al. (2003, p. 450) defined this formative construct of behavioural intention as "the degree of ease associated with the use of the system." As a recent trend, comprising ultra modern wireless telecommunication equipments, sensors, Internet, and health data monitoring devices where self-service technology is pervasive, consumers' easy handling capacity is perceived as a dominating determinant for behavioural intention which is supported by an online behavioural researcher (Chen & Li, 2010; Lichtenstein & Williamson, 2006; Pavlou & Fygenon, 2006). The authors redefine this concept with the generic view of m-health as the degree of ease associated with the remote and self-use of the overall system of m-health.

**H2.** Effort expectancy (EE) has a positive influence on citizens' behavioural intention for m-health adoption behaviour.



### 3.3. Social influence (SI)

Social influence has comprehensively conceived the underlying concepts illustrated in TRA, TAM2, TPB and C-TAM-TPB, social factors in MPCU, and image in IDT. Integrating the generic concept from the above mentioned constructs, Venkatesh et al. (2003, p. 451) defined this formative construct of behavioural intention as “the degree to which an individual perceives that important others believe he or she should use the new system.” Adoption of m-health as a new system, where the system partially could be embedded with any living portions of the user which is visible to others for many days, should have potential normative influence on others associated with the adopters which is observed in related studies (Lichtenstein & Williamson, 2006; Pavlou & Fygenon, 2006). Like the reference group, depicted in consumer behaviour literature (Bearden & Etzel, 1982), aspirational and associative reference groups' influence might have a pursuance effect on the user of m-health. The authors amended the definition by keeping it congruent with a functional view of m-health. They defined it as the degree to which an individual perceives that important others believe that he or she should use the new health system in their daily life by leaving the regular health-care service system.

**H3.** Social influence (SI) has positive influence on citizens' behavioural intention for m-health adoption behaviour.

### 3.4. Facilitating conditions (FC)

In the UTAUT model, the concept of facilitating conditions is explained as “the degree to which an individual believes that an organisational and technical infrastructure exists to support use of the system.” Venkatesh et al. (2003, p. 453) derived this concept reflecting certain overlapping concepts from the constructs perceived behavioural control (TPB, C-TAM-TPB), facilitating conditions (MPCU), and compatibility (DOI). Successful and appropriate usage of the m-health service system largely depends on continuous communication between host and service provider who are located in two different remote places. Excluding adopters' individual capability to use the system and performance of technology to function properly, the service providers' capacity and capability to relentlessly monitor and feedback in a trusted manner is a prevalent condition for pursuing users to adopt any innovative systems from anywhere, anytime (Kumar, Kumar, Shareef, & Sharan, 2013; Peekhaus, 2008; Weerakkody, Janssen, & Dwivedi, 2011). The consumers concern for security, privacy, and reliability has a substantial contribution in conceiving this remote technology-driven system where a face-to-face encounter is absent (Gefen et al., 2003; Gelders et al., 2009; Lin & Wang, 2006; Mallat, 2007; O'Cass & Fenech, 2003; Pavlou & Fygenon, 2006). Thus, the construct facilitating conditions is perceived as a dominating determinant of behavioural intention of consumers for m-health, and formulated here as the degree to which an individual believes that an organisational and technical infrastructure and continuous trustworthy support system exists to support the use of the system continuously from any justified remote places with reliability.

**H4.** Facilitating conditions (FC) has a positive influence on consumers citizens' behavioural intention for m-health adoption behaviour.

The authors have also reviewed the extends of the UTAUT model and the extended theory UTAUT2 (Venkatesh, Thong, & Xu, 2012). They argued and from a theoretical perspective justified that in the consumer context the aforementioned four constructs do not have enough explanatory power to capture the comprehensive behaviour of consumers. They proposed that the UTAUT model is primarily directed to capture and explain the adoption behaviour of the new technology in the organisational context. However, for any specific consumer context, where consumers' preference is contingent upon several social and

behavioural aspects, three other determinants should be included to focus and integrate citizens' behavioural attitude from the marketing perspective (Benbasat & Barki, 2007). These are hedonic motivation, price-value, and habit.

### 3.5. Hedonic motivation (HM)

In formulating consumers' behaviour, several researchers from marketing, ICT, social and behavioural psychology identified this construct as a pursuing factor for adoption (Thong, Hong, & Tam, 2006). Particularly, researchers studying online consumer behaviour firmly asserted that online adoption has a certain impulsive and enjoyment aspiration and thus, in recent marketing literature, hedonic motivation or a perceived enjoyment aspect has achieved enormous attention by the marketing strategists (Kim et al., 2008; Rook, 1985; Sirgy, 1982; Turel, Serenko, & Bontis, 2007). Venkatesh et al. (2012, p. 161) defined hedonic motivation (HM) in consumer aspect as “the fun or pleasure derived from using a technology.” Over a long period of time, medical history suggests that patients will go to a hospital or clinic to receive the health-care service, and medical professionals will provide the desired service through face-to-face interaction. But the specific characteristics of m-health, which is an alternative channel to receive services for a similar type of medical problems, is exhaustively dominated by consumer preferences which have both cognitive, affective, and behavioural components of beliefs (Hong & Tam, 2006; Kim et al., 2008). Consequently, perception of enjoyment might have an influencing effect on behavioural motivation to adopt m-health which is defined here as the affective fun or pleasure derived from using this alternative health-care service system.

**H5.** Hedonic motivation (HM) has positive influence on citizens' behavioural intention for m-health adoption behaviour.

### 3.6. Price value (PV)

According to the social exchange theory, exchange in social context is reciprocal which means, parties involved in exchange must benefit from the exchange regardless of its tangible or intangible values (Turner, 1982). Alford and Biswas (2002) explained further regarding product-price exchange in the marketing context recommending that customers expect reciprocal value from the product in exchange of price they incur. Transaction cost analysis (Williamson, 1987) asserted this overarching concept from a theoretical acknowledgement. In assessing acceptance and actual usage behaviour in the consumer context, Venkatesh et al. (2012) extended the original UTAUT model by introducing UTAUT2 with the inclusion of price-value among others to capture the consumers aforementioned exchange preference. When consumers buy a product or service, consumers' preference for selecting a specific brand over other alternatives is inclusively controlled by the exchange of money for the value attained from the product (Burnham et al., 2003; Lichtenstein & Williamson, 2006). Under this concept, Ba and Pavlou (2002) recognised that consumers' cognitive evaluation of price-value belief is a pursuing factor for adoption behaviour. Referring to Dodds, Monroe, and Grewal (1991), the UTAUT2 model (Venkatesh et al., 2012, p. 161) defined price-value as “consumers' cognitive trade-off between the perceived benefits of the applications and the monetary cost for using them.” m-health is substantially an alternative channel to receive health-care services. It is probably a replacement of adopting regular health-care service where the physical presence in hospital and clinic is mandatory. So, why might patients be cognitively interested and fascinated in accepting this presumably relatively unfamiliar new health-care service which is susceptible to security threats and could be apparently unreliable and untrustworthy? Among so many reasons, the shedding of light on transaction cost analysis, the authors can infer that price-value could be a strong determinant in



The consumers own evaluation of self-personality with the stereotyping image of m-health and perception of congruency of both may have the potential effect on behavioural intention leading to final adoption behaviour. The authors define self-concept here as the degree to which a citizen's preference, in the light of self-intrinsic evaluation of one's own personality-related traits, is perceived to be congruent with the m-health image.

**H8.** Self-concept (SC) has influence on citizens' behavioural intention for m-health adoption behaviour.

#### 4. Research methodology

This study has a twofold objective to capture the citizens' adoption behaviour for m-health which has technological, social, psychological, and marketing artefacts as well as cross-cultural effects on the determinants of citizens' adoption behaviour. In this connection, the study was conducted on citizens' of three countries. They have significant distinctive cultural traits according to Hofstede (2001) in terms of individualism, uncertainty avoidance, power distance, with the same questionnaire. The authors conducted the study among the diabetic patients of USA, Canada, and Bangladesh. These three countries were also selected as they provided the scope to conduct the same study for m-health following the same procedure. However, except for the measuring items of waiting time and social concept, all other measuring items were extracted directly from the UTAUT and UTAUT2 model. Due to the revisions of those items and to keep it consistent with the amended concepts of the proposed determinants of m-health, the authors organised a focus group to evaluate and modify the scale items if required for conceptual clarity of understanding. The focus group was made up of one university professor of marketing, one medical professional, and an ICT expert from the three countries: the USA, Canada, and Bangladesh. So, altogether the nine experts who were members of the focus group verified the questionnaire. Based on the revised questionnaire, the authors launched a pilot study among five MBA marketing students and five medical students to obtain a further insight regarding the clarity of the intended meanings of the scale items. The authors edited the measuring items in the light of recommendations made by both the focus group and respondents of the pilot studies for our final empirical study.

##### 4.1. Scale development

The authors have a total of eight proposed determinants of m-health adoption behaviour. The measuring scales of the independent variables, except waiting time and social concept, are directly extracted from the two models – UTAUT and UTAUT2 – and modified to keep it consistent with the redefinitions of the determinants of m-health acceptance behaviour. The measuring items for waiting time and social concept are prepared in the light of the literature review (Bucklin, 1966; Sirgy, 1982) and suggestions of the focus group. The final questionnaire is shown in Appendix A. The scale items of the independent variables were measured by a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

##### 4.2. Sample selection

Since m-health is an extremely recent phenomenon and not fully generalised in different countries, it was almost impractical to launch a similar study in three different countries to capture the citizens' acceptance behaviour based on perceptions attained from prior experience. Therefore, accepting suggestions of the focus group, the authors designed and proposed an m-health project. In the light of the description of this project, citizens or consumers like diabetic patients who are now taking traditional health-care services repeatedly from any medical

hospital for diabetes, blood pressure, and cholesterol monitoring were presented with the proposed project of m-health. They were asked to respond in the questionnaire based on their perceptions of seeking that alternative health-care service illustrated in the authors proposed m-health service system. With the help of research assistants, the authors contacted those patients personally in hospitals and explained to them the details of the proposed mobile health monitoring system for their diabetes and other health issues. They can attain this service and use it continuously on-the-spot as a remote patient from anywhere without coming physically into the health-care centres thereby maintaining a regular, professional daily routine. This proposed m-health project is an alternative to the regular diabetes management health-care system which they are currently accepting. Details of the project were explained before providing them with the questionnaire while they were waiting in the hospital waiting room as an out-patient to have a face-to-face communication and interaction with the respective medical professionals. The proposed m-health project is designed and described in the following fashion:

*Instead of getting this traditional diabetes health-care service with repeated and regular visits to hospitals/clinics for monitoring blood-glucose, blood pressure, and cholesterol levels, you can get a similar service on-the-spot from anywhere, even remote places and thereby continuing to maintain your regular, professional daily routine. This can be achieved through m-health in the aid of wireless technology, sensors, Internet, and other modern health monitoring equipment. As part of this programme, you will have to wear a hospital-provided device (sensors) such as a Radio Frequency Identification (RFID) equipment with different sensors capable of measuring different physical changes; also a location identifier containing accelerometers, pedometers, electrocardiograms, pulse oximeters, blood-glucose meters, weight scales, GPS, etc. Wearing a wristband will continuously monitor your blood-glucose, blood pressure, and cholesterol levels as well as activity and diet levels and calories burned. Your smart-phone is connected to these sensors through embedded software and these sensors will monitor your activity and wirelessly send encrypted data to your smartphone. This data will be further transmitted to the respective medical professionals on their hand-held mobile data processing tools like a personal data assistant (PDA), pocket PC, palm and laptop, and, finally, by way of a wireless network such as the WiFi Internet network. So, you are continuously connected with and monitored by the medical professionals. The consultant will periodically monitor your data and send you an SMS for your regular instructions and tips.*

##### 4.3. Empirical study

Data from the USA, Canada, and Bangladesh was collected from the patients following the same procedure.

At first, the authors performed the study in New York, USA among the diabetic patients who were born in the USA in three big hospitals in Manhattan. The hospitals are Bellevue Hospital Center, New York Presbyterian Hospital, and New York University Hospital (NYU). The NYU has a diabetes management training programme which is conducted in different hospitals including the three hospitals selected above. Under this programme, medical professionals regularly provide health-care treatment to diabetic patients, monitor their health issues, and provide advice for self-monitoring and management. The authors conducted this empirical study among those patients in those three hospitals. With all required devices of the proposed m-health project, the authors demonstrated the service in a real scenario and with a detailed relevant explanation. The patients were asked to provide answers in their next visit to this hospital based on their perceptions. The authors provided them time so that they can think about their experiences and consult with their family friends, relatives, and colleagues who have influence on their daily life pattern. It was a two-month study launched by four colleagues among those patients who came for this





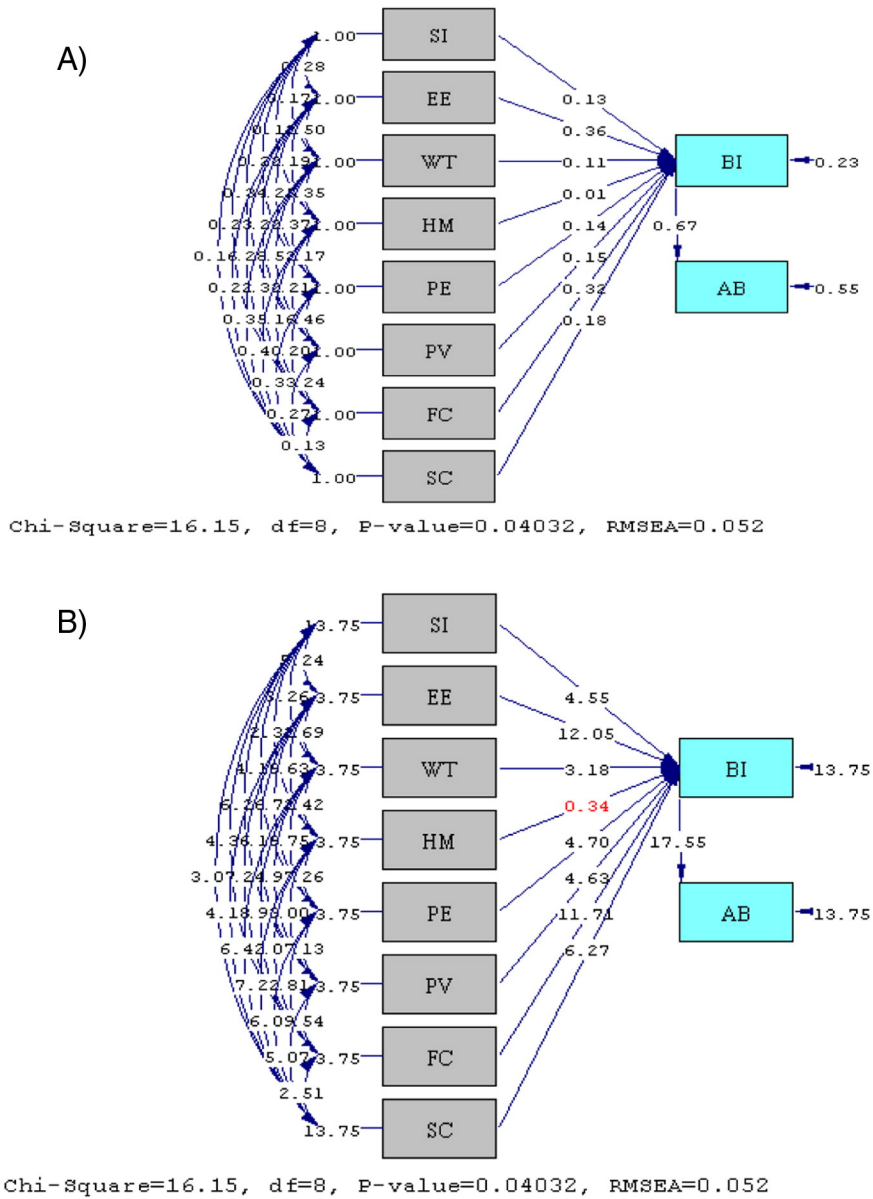


Fig. 1. A. Citizens' adoption behaviour model of m-health (path coefficients) (USA). B. Citizens' adoption behaviour model of m-health ('t' values) (USA). Legend for Fig. 1A and B: SI = Social influence; EE = Effort expectancy; WT = Waiting time; HM = Hedonic motivation; PE = Performance expectancy; PV = Price-value; FC = Facilitating conditions; SC = Self-concept, BI = Behavioural intention; AB = Adoption behaviour.

that the model fit compares reasonably with the literature (Kline, 2005, pp.133–144). The recommended values in this literature and the authors' findings are shown in Table 1.

5.4. Path model: Canada

Following the same procedure, the final m-health adoption model for the Canadian sample is shown in Fig. 2A and B. For Canadian citizens, adoption behaviour is similar with minor differences. However, although the hedonic motivation is non-significant here too at 0.05 level, surprisingly its insignificant contribution is negative. The different model fit indices are shown in Table 1.

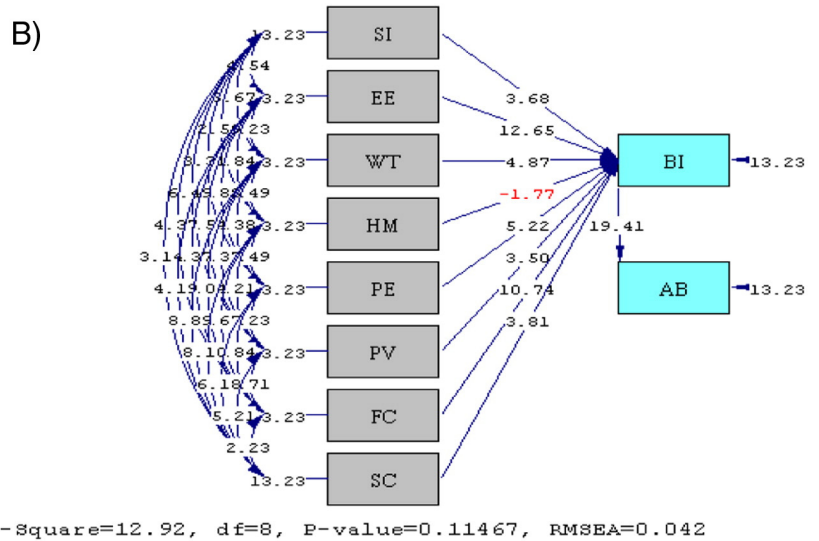
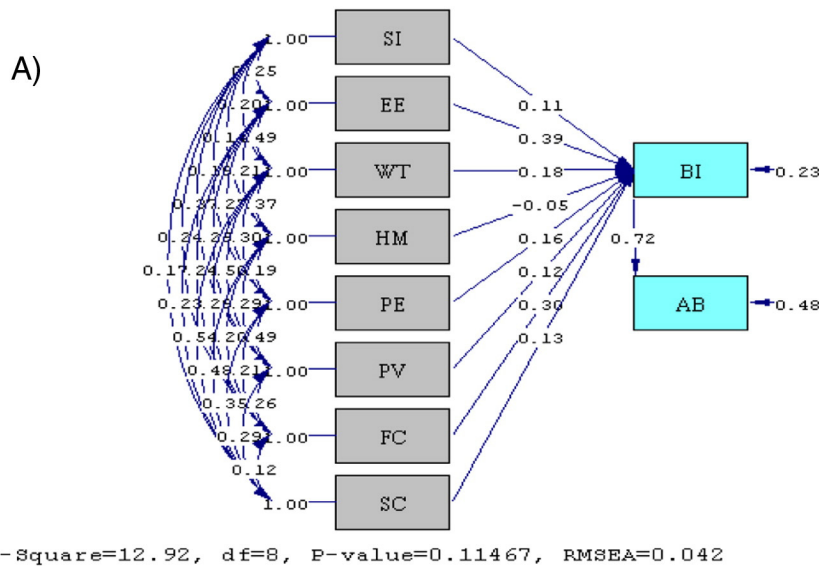
5.5. Path model: Bangladesh

Following the same procedure, the final m-health adoption model for the Bangladeshi sample is shown in Fig. 3A and B. For Bangladeshi

Table 1  
Citizens' acceptance behaviour for m-health: model fitness values for USA, Canada, and Bangladesh.

Fit measures	Recommended values	Citizens' adoption behaviour		
		USA	Canada	Bangladesh
Chi-square ( $\chi^2$ )	$p \geq 0.05$	16.15 (0.04032)	12.92 (0.11467)	13.58 (0.09331)
Degree of Freedom		8	8	8
$\chi^2$ /Degree of Freedom (DF)	$\leq 3.0$	2.01875	1.615	1.6975
Comparative Fit Index (CFI)	$\geq .90$	1.00	1.00	1.00
Incremental Fit Index (IFI)	$\geq .90$	1.00	1.00	1.00
Relative Fit Index (RFI)	$\geq .90$	0.96	0.97	0.97
Goodness of Fit Index (GFI)	$\geq .90$	0.99	0.99	0.99
Adjusted Goodness of Fit Index (AGFI)	$\geq .90$	0.94	0.95	0.95
RMSEA	$< 0.06$	0.052	0.042	0.044
Normed Fit Index (NFI)	$\geq 0.90$	0.99	0.99	0.99
Non-Normed Fit Index (NNFI)	$\geq 0.90$	0.98	0.99	0.99





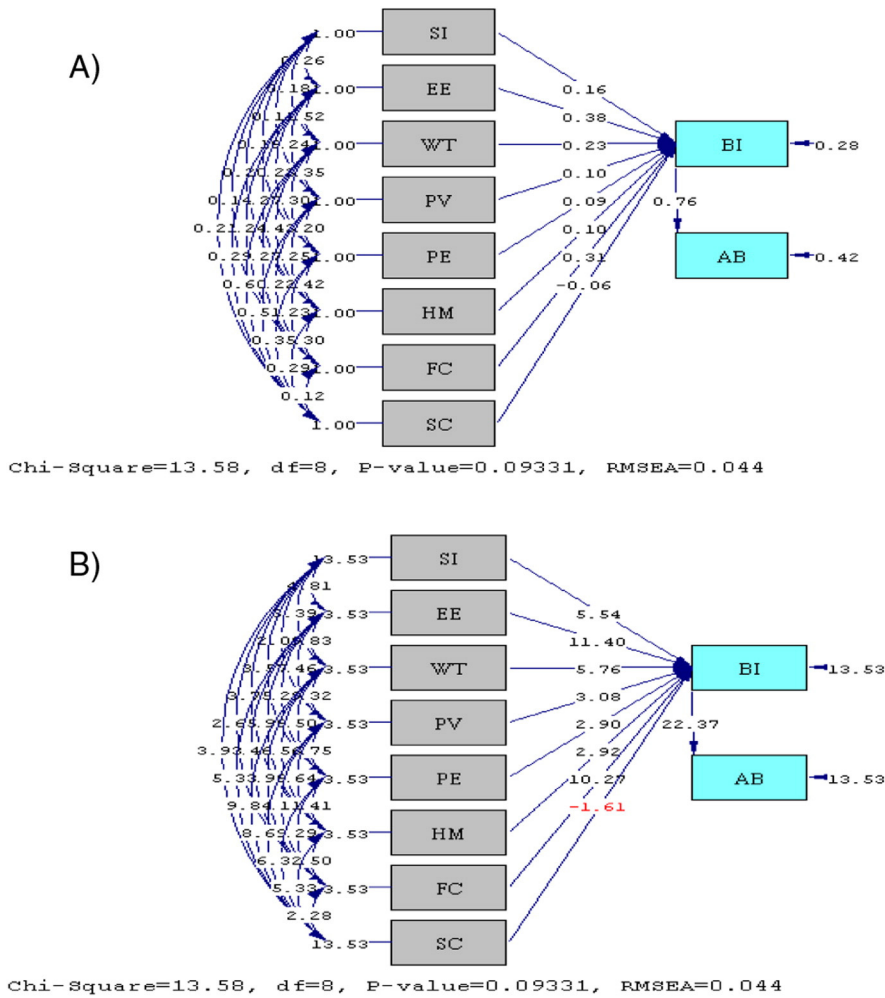
**Fig. 2.** A. Citizens' adoption behaviour model of m-health (Path coefficients) (Canada). B: Citizens' adoption behaviour model of m-health ('t' values) (Canada). Legend for Fig. 2A and B: SI = Social influence; EE = Effort expectancy; WT = Waiting time; HM = Hedonic motivation; PE = Performance expectancy; PV = Price-value; FC = Facilitating conditions; SC = Self-concept, BI = Behavioural intention; AB = Adoption behaviour.

citizens', adoption behaviour is significantly different with different levels of contributions of different determinants to predict usage behaviour. The different model fit indices are shown in Table 1.

In Table 2, the authors have listed all the determinants of citizens' behavioural intention leading to adoption behaviour for USA, Canada, and Bangladesh denoting their contribution sequence. Values of the unstandardised factor loadings estimate the change in the endogenous variable for unit change on the respective exogenous variable given the effects of other factors are constant. Suppose for the USA, effort expectancy (EE) has a loading factor equal to 0.36. A unit positive change on effort expectancy will cause a 0.36 unit positive change on behavioural intention (BI) for USA citizens' m-health adoption behaviour when all other determinants remain constant.

The authors can draw a couple of potential conclusions from the analysis briefly noted in Table 2. For all the three cultural samples of the UTAUT model, describing effort expectancy, performance expectancy, facilitating conditions, and social influence are quite appropriate to predict citizens' behavioural intention for m-health. Behavioural intention significantly leads to actual adoption behaviour. The effect of behavioural intention on actual behaviour is highest for the

Bangladeshi consumer (0.76) and lowest for the USA citizens (0.67). In addition to these general behavioural factors, from UTAUT2 model, the authors included two determinants for citizen context; namely hedonic motivation and price-value. Price-value is also a common determinant for all the three distinguished cultures. However, hedonic motivation, although a determinant for the Bangladeshi citizens, is not a significant determinant for USA and Canadian citizens who are supported by many online researchers (Torkil, 2012). From the marketing and distribution literature, and also supported by behavioural psychology, the authors added two other determinants; namely, waiting time and self concept. Waiting time is also a determinant for all three cultural samples but social concept is thought to be a significant predictor for behavioural intention for the USA and Canadian samples, but not for the Bangladeshi citizens. So, finally, the authors concluded that the six determinants (namely, effort expectancy, performance expectancy, facilitating conditions, social influence, price-value, waiting time) are common to predict and theorise consumers' behavioural intention for m-health which leads to final adoption behaviour. For the USA and Canadian samples, on top of those six determinants, self concept is also a determinant for behavioural intention, and for Bangladeshi



**Fig. 3.** A. Citizens' adoption behaviour model of m-health (Path coefficients) (Bangladesh). B. Citizens' adoption behaviour model of m-health ('t' values) (Bangladesh). Legend for Fig. 3A and B: SI = Social influence; EE = Effort expectancy; WT = Waiting time; HM = Hedonic motivation; PE = Performance expectancy; PV = Price-value; FC = Facilitating conditions; SC = Self-concept, BI = Behavioural intention; AB = Adoption behaviour.

citizens, hedonic motivation is a contributing factor for behavioural intention. Another potential conclusion from Table 2 is that different determinants of behavioural intention have different contributions in shaping citizens' behaviour. However, effort expectancy and facilitating conditions are the two highest contributing factors to have an effect on behaviour irrespective to any culture.

**6. Theoretical and practical implications**

The study was conducted in three countries namely USA, Canada, and Bangladesh to reveal consistency in data collection as well as

difference in cultural traits. Since m-health is still not observed in most of the countries of the world, it is difficult to conduct any m-health study in more than one countries under the same pattern. In these three countries, we got the opportunity to conduct this study among diabetic patients following the same procedure. And these three countries have significant differences in the light of Hofstede's cultural dimension.

The findings of this study have a number of theoretical and practical implications (Janowski & Janssen, 2015) for ICT and policy makers as well as for medical professionals. In the first phase, the authors can shed light on the theoretical implications of conjoint consumer (patients as consumer) behaviour modelling and accentuating both

**Table 2**  
Determinants of citizens' behaviour for m-health with loading factors.

Construct	USA			Canada			Bangladesh		
	Loading	Sequence of contribution	Comment	Loading	Sequence of contribution	Comment	Loading	Sequence of contribution	Comment
Effort expectancy	0.36	1	Significant	0.39	1	Significant	0.38	1	Significant
Facilitating conditions	0.32	2	Significant	0.30	2	Significant	0.31	2	Significant
Self concept	0.18	3	Significant	0.13	5	Significant	-0.06	8	Non-Significant
Price value	0.15	4	Significant	0.12	6	Significant	0.10	6	Significant
Performance expectancy	0.14	5	Significant	0.16	4	Significant	0.09	7	Significant
Social influence	0.13	6	Significant	0.11	7	Significant	0.16	4	Significant
Waiting time	0.11	7	Significant	0.18	3	Significant	0.23	3	Significant
Hedonic motivation	0.01	8	Non-significant	-0.05	8	Non-significant	0.10	5	Significant
Behavioural intention	0.67	Not applicable	Significant	0.72	Not applicable	Significant	0.76	Not applicable	Significant





channels based on price and value which is supported in this study. In terms of receiving value, the price of m-health must be lower compared with the traditional health service system. Medical professionals should deliberate over this point to make m-health a consumers' preference. Nowadays, consumers are very prone to get enjoyment from any online system (Turel et al., 2007) and consequently, market researchers are concerned for the consumers' hedonic motivation for the product (Kim et al., 2008). The UTAUT2 model advocated this consumer behaviour. However, the authors' findings revealed a mixed result for affective belief of m-health to shape behavioural intention. They found an effect of affective belief on behavioural intention for m-health is culture bound. Similarly, congruency of the product image with personal characteristics denoted by the social concept is also a culture bound determinant. While for western consumers like the USA and Canada, the social concept is a determinant and the hedonic motivation does not contribute in shaping behavioural intention for m-health. Bangladeshi consumers show the opposite behaviour in these two proposed determinants of consumer behaviour.

### 6.3. Implications for cross cultural study

Researchers (Ba & Pavlou, 2002; Donthu & Yoo, 1998; Ein-Dor et al., 1993; Espinoza, 1999) who advocated for a cross-cultural effect on consumers' behaviour and did not suggest any generalised and standardised concept for behaviour must find strong underpinnings that consumers' behaviour for alternative products depends on the cultural traits and thus consumers' preference should be customised. In an extended research among USA and Belgian consumers, Harris, van Hoye, and Lievens (2003) recognised that although there are certain commonalities, cross-cultural differences in the perception process between these two cultures is prominent. Similar findings were voiced by several cross-cultural researchers who were engaged in identifying consumers' differences for online-based products among Asian, European, North American, South American and African cultures (Goodman & Green, 1992; Torkil, 2012; Young et al., 2012). In perceiving self-effort and facilitating conditions as the top influential elements in pursuing behavioural intention, all three samples showed a similar behaviour. Waiting time was the third most important determinant for Canadian and Bangladeshi consumers whereas it has less profound effect on USA consumers' perception. Severe shortages in medical professionals in Canada and Bangladesh as well as traffic jams in Bangladesh might lead to perceive that waiting time is an important determinant to grow behavioural intention of consumers of these two countries for m-health which could be available from any place without continuous visits to medical professionals. As a top individualistic country having less pronounced effect of uncertain avoidance (Hofstede, 2001), consumers of the USA and Canada are very concerned of their own personality trait and its congruency with a product image rather than hedonic motivation which is supported by many cross-cultural researchers (Espinoza, 1999; Kettinger et al., 1995; Winsted, 1997). The aforementioned researchers also suggested that as top proponents of a free economy, USA consumers are more concerned of value of the products in relation to its exchange rate which is acknowledged in this research.

## 7. Conclusions

Adoption by users is still misunderstood by policy-makers and in theory. The study explored citizens' behavioural intention leading to usage behaviour for m-health which is explicitly an alternative channel to seek medical service by integrating technological artefacts from the UTAUT, consumers context from the UTAUT2, and psychological behaviour from focusing consumer preference through a channel and product selection criteria. It also investigated cultural domination on citizens' behavioural perception. Under this aspect, the proposed comprehensive model was experimented among citizens of the USA, Canada, and

Bangladesh who have pronounced cultural differences. Citizens of the three countries have shown several similarities as well as differences in their m-health adoption behaviour. Based on a diabetes-related m-health project demonstrated with realistic illustrations among actual patients (as consumer), i.e. diabetic patients, citizens' perceptions were captured. For the three separate models, squared multiple correlation coefficients ( $R^2$ ) described the amount of variance of the determinants for behavioural intention: 0.77, 0.77, and 0.72 respectively for the USA, Canada, and Bangladeshi. For the three samples, the authors observed the same trend that behavioural intention strongly leads to actual behaviour for m-health. For the first objective, the authors identified determinants for citizens' behavioural intention leading to adoption behaviour for m-health; however, for the second objective, the authors revealed that this adoption behaviour cannot be generalised to other cultures, rather as sought substantially, it is culture bound.

The findings suggest that the UTAUT model could partially shape technology artefact behaviour and the extended UTAUT must consider specific determinants relevant to cognitive, affective, and conative or behavioural aspects of citizens and must be incorporated. In this kind of consumer behaviour aspect, marketing as well as behavioural psychology has conjoint effects. For consumer preference in predicting adoption-related behaviour, the price-value from UTAUT2 is a significant predictor. Depending on the product or service, consumers' preference might be dependent on hedonic motivation; however, it is culture bound. For western culture, where integrated artefacts of technology, cognitive preference of consumer, and impulsive motivation conjointly focus on any behaviour, hedonic motivation might not have significant effect. Adoption rate of Electronic-government by USA and Canadian citizens is also an important factor in this aspect (Shareef et al., 2011). Since citizens of these two countries have long experience in using virtual public media (Reddick & Turner, 2012), they do not feel any hedonic reason for adopting m-health. But as a recent phenomenon, Bangladeshi citizens search for fun from this virtual medium. Effect of price-value among the citizens of the three countries also provides justification of the differentiated effect of hedonic factor among the three countries. But in this context, social concept has a contributing effect in shaping behaviour.

### 7.1. Limitations and future research directions

It is expected that this research will provide medical professionals as well as ICT and marketing researchers with some excellent practical guidelines in providing service to people. However, this research has some unavoidable limitations. The model is tested only for medical service. This finding should be investigated for other kinds of services. One obvious limitation is the citizens' perception procedure outlined in the methodology section. Since, it is a new trend and completely exploratory, there was an extremely limited scope to get enough citizens in the three countries who had the same type of m-health prior experience. As a result, the authors designed this proposed m-health project. However, the authors illustrated it in front of the respondents practically and provided time for their cognitive belief. In this study, the patients are receiving service from public hospital/clinic. Different segments of people who used to take this service from private clinics might show different phenomena. However, due to limited adoption of m-health, it could not be conducted among different consumer segments. The claim of cultural effect on m-health adoption behaviour could not get enough strength unless it is tested among different consumer segments of several countries having different cultural traits under Hofstede's (2001) revelation. Researchers could experiment on this model in different countries for different types of consumer behaviours having combined ICT, marketing, and consumers' behavioural artefacts. Like the UTAUT model, the moderating effects of gender, age, and experience could be investigated in future. Further work may also be beneficial from investigating citizens' confidence in both their ability to use a mobile-based system as well as in other health systems and processes that enables



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