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# A Generalized 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 country's cultural traits. These findings basically extend the theoretical concept of UTAUT model to articulate adoption behavior of any complex and sensitive ICT related issues like mobile healthcare system.

**Keywords:** Mobile health (m-health), Adoption behaviour, Consumer preference, Consumer behaviour, UTAUT model, Cultural effect

## **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, 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, Forthcoming). 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 (Halperin 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 reveal the cultural impacts on the integrated health and technological adoption behaviour for citizens toward m-health. Pavlou & 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 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 remainder 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., Forthcoming). 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 et al., 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., Forthcoming). 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 and Jagdish, 1969).

## *2.2 Cross-Cultural Effect*

Posey, Lowry, Roberts, & 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 & 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, & 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 behavior. Ives & 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 behavior, governing factors of m-health adoption behavior as an exploratory marketing concept

does not essentially include post purchase behavior in the adoption model. As adoption behavior 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 synthesize some ICT related adoption behavior 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 & 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 and 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 et al., 2011) 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 & 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 & 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 & 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 et al. (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 pursuance 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 et al. (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 et al., 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) (Thomson 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.

#### *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.

H<sub>1</sub>: Performance expectancy (PE) has positive influence on citizens' behavioural intention for m-health adoption behaviour.

#### *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 & Fygenson, 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.

H<sub>2</sub>: Effort expectancy (PE) has a positive influence on citizens' behavioural intention for m-health adoption behaviour.



### *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 & Fygenson, 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.

H<sub>3</sub>: Social influence (SI) has positive influence on citizens’ behavioural intention for m-health adoption behaviour.

### *Facilitating conditions (FC)*

In the UTAUT model, the concept of facilitating conditions is explained as “the degree to which an individual believes that an organizational 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 et al., 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 & Fygenson, 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.

H<sub>4</sub>: 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 et al., 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.

#### *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 et al., 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 et al., 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 behavioral 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.

H<sub>5</sub>: Hedonic motivation (HM) has positive influence on citizens' behavioural intention for m-health adoption behaviour.

#### *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 (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 and Williamson, 2006). Under this concept, Ba & Pavlou (2002) recognised that consumers' cognitive evaluation of price-value belief is a pursuing factor for adoption behaviour. Referring to Dodds et al. (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 capturing consumers' behaviour for m-health adoption; this has extensive support from the marketing literature. The authors redefine the construct price-value for m-health as the cognitive trade-off between the values citizens experienced through the usage of the m-health service system as an alternative channel to health-care service received the alternative system and the monetary costs including the opportunity of cost for using them.

H<sub>6</sub>: Price-value (PV) has influence on citizens' behavioural intention for m-health adoption behaviour.

### *Habit*

Referring to Kim et al. (2005), Venkatesh et al. (2012, p. 161) viewed habit as "the extent to which people tend to perform behaviors automatically because of learning." The authors added that habit could be based on experience of prior behaviour. Pavlou & Fygenon (2006, p. 126) defined habit as an antecedent of behavioural intention and commented that "Habit represents a variable that measures the frequency of repeated performance of behavior." Since the m-health study is intended to conceive citizens' behaviour which is not based on prior behavioural evaluation, the authors do not find justification to add the construct habit as an alternative to behavioural intention leading to usage behaviour.

The authors further extended the investigation to model the consumer behaviour for m-health which has three dominating artefacts: decomposed beliefs for remote controlled technological issues; social and psychological issues for this alternative health-care

system; and pure consumer behavioural issues for this newly advocated product and service delivery channel. For the first two artefacts, the authors have already articulated determinants of the consumer's m-health usage behaviour. For conceptualising comprehensive model reflecting all the three artefacts of consumers for this radical advent, the authors extended the exploration in the field related to the marketing channel.

*Consumer Preference for Alternative Channel: Waiting time (WT)*

A particular product or service can be bought in a market in multiple ways; it depends on the customers associated service requirements. Consequently, when consumers decide to buy any product or service, the pursuing concerns are not only what they want to buy but also how they want to buy the same product (Neslin & Shankar, 2009). While a product is sold in a market for different segments of consumers, it may not be the product that changes but the method of buying the product with relevant service requirements associated with selling that accompany the product that may change (Voss, 2004). This argument to predict consumers' behaviour is specifically appropriate when the same or similar product could be purchased from different marketing channels. Since m-health, if not completely, is partially offered through different channels with different service criteria, scopes, and patterns. Consumers' service requirements associated from this radical innovative channel certainly find behavioural intention with particular service output demand. In the light of the marketing distribution literature, we get light about selection of marketing channel based on service out-put demand from Bucklin's theory (1966). The author contributed to foster the service requirements of consumers stating that at distribution, four service output levels are important to minimize storage, searching and other cost of the customers when they buy any products from a specific channel. Under this theory among the four service output demands - bulk breaking, spatial convenience, waiting time, product variety and assortment - we find logical underpinnings to consider waiting time as the determinant of pursuing acceptance behaviour for m-health. Among several burning and revolutionary characteristics of m-health, consumers' preference for accepting this health-care system depends substantially on the flexibility of the waiting time aspect congruent with a professional and daily life pattern (Kumar et al., 2013). The general explanation of the service output demand of waiting time variable in the light of channel management reflects the time elapsed between ordering and receiving products and services (Bucklin, 1966). Focusing on the waiting time concept for m-health, it has two interconnected artefacts: a) time saved in moving to a hospital or clinic, and after seeking a medical professional service, time elapsed to receive that service; and b) time saved in daily life by keeping engagements thereby avoiding repeated visits to medical professionals by adopting the m-health health-care system. In many countries, both the artefacts of the health-care service system are potentially significant, as it requires many days to get a medical professional's appointment. After arranging the appointment, the waiting time is too long to get the actual service. A repeated visit is extremely time-consuming from both the physician's availability and transport accessibility. The authors define the waiting time concept for the m-health as the degree to which an individual believes that using the m-health-care system can save irrevocable time in receiving repeated health-care service and thereby keep a running daily professional life. The core concept of transaction cost analysis also

asserted this argument that this convenience can trigger citizens' preference in accepting this flexible on-the-spot health-care service system that is available in remote places at anytime.

H<sub>7</sub>: Waiting time (WT) has a positive influence on citizens' behavioural intention for m-health adoption behaviour.

### *Self-concept (SC)*

Consumer behaviour researchers have acknowledged that an intertwined effect of social and psychological phenomena has enormous impact on consumers' preference to buy any product (Mallat, 2007). Basically, a synthesised concept of social influence and facilitating conditions partially conceives an image ingredient of subjective norm and compatibility ingredients of self-beliefs to accept a system. However, consumers' personality and internal self-perception about the gravity of any products has certain additional appeal to conceptualise another consumer preference variable known as self-concept. The image concept (Moore & Benbasat, 1991) has an external phenomenon and a compatibility concept (Rogers, 1995), although it reflects internal evaluation, it also indicates a real congruency of life-style with the adopting system (Wu & Wang, 2005). Yoh et al. (2003) identified that social acceptance of any behaviour for a specific product could be a dominating reason to pursue a purchase which is also acknowledged in the theory of prospective gratification (LaRose et al., 2001). Marketing researchers have for a long time argued that product features and visible characteristics constitute a conspicuous stereotyping image about the product among the consumers' mind, and when consumers perceive that use of that product is congruent with their personality traits, they are pursued to use that product (Schewe & Dillon, 1978).

Consumers believe that the use of certain products in accordance to its image can match their behavioural characteristics and thus, they show a preference for a specific product in lieu of other alternatives (Sirgy & Danes, 1982). This understanding and perception of an individual about him/herself offsetting on the products' image is defined by psychologists, behavioural theorists, and marketing researchers as self-concept (Rook, 1985). Rosenberg (1979, p.7) defined self-concept as the "totality of the individual's thoughts and feelings having reference to himself as an object." Sirgy (1982) explained that product consumption as a symbol of image has a strong correlation with self-concept as a persuasion phenomenon. As Sirgy (1982, p.289) denoted that "Consumers were thought to prefer products with images that were congruent with their self-concepts". This kind of symbolic behaviour of consumers for a specific product has an essential element from ritual behaviour which pursues consumers in selecting a specific product (Michael & Becker, 1973).

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.

H<sub>8</sub>: 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 training programme. After distributing the questionnaires among five hundred patients, 387 responses were returned.

The authors completed the same study in two months with the same questionnaire in Ottawa among diabetic patients who needed a regular check-up. Under the community diabetes education programme of Ottawa, patients visit different centres in the City of Ottawa for diabetes management. The authors conducted the study at four different centres in the diabetes management community programme by following the same procedure. The authors, with the assistance of four colleagues from Carleton University, Ottawa, distributed five hundred questionnaires and received 359 fully completed questionnaires in return. By getting almost a similar number of responses, our statistical analyses for the samples of the three countries have almost the same statistical power,

For Bangladesh, the survey was conducted in Dhaka City among registered diabetic patients in the Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine and Metabolic Disorders (BIRDEM). It is an internationally recognised advanced diabetic hospital in Bangladesh. This is a specialised diabetic hospital providing regular health-care services with monitoring and advice for diabetes, blood pressure, and cholesterol to more than one million people in Bangladesh. Following the same procedure, in a period of two months, the authors distributed the questionnaire to diabetic outpatients who visited this hospital as registered patients and who were waiting for medical professionals in the waiting room. The authors requested them to fill out the questionnaires during their next visit. With the help of four research assistants, the authors distributed five hundred questionnaires and received a return of 375 fully completed questionnaires.

Since we have eight cause-effect relations to measure m-health acceptance behaviour, a sample size of any number close to 160 or higher is good enough for the measurement method (Hoe, 2008).



## 5. Analysis and Result Interpretations

The authors first conducted a demographic analysis for the samples collected from the three countries. Although the actual UTAUT and UTAUT2 models used gender, age, and experience as moderating variables as the exploratory study, the authors did not attempt to incorporate those three variables in the proposed model to evaluate their moderating effects on the exogenous variables of adoption behaviour. Nevertheless, the authors collected information for those three variables to identify representation of the collected sample. Since diabetes is a phenomenon which is more observable among old aged people, the study revealed from the sample that the average age of respondents is 53 in USA, 55 in Canada, and 56 in Bangladesh. In the collected samples from the USA, Canada, and Bangladesh, the male versus the female ratios were 1:82, 1:88 and 1:76. Since prior m-health experience is not extensive, the authors collected information using any kind of wireless phones like a smartphone, iPod, or regular mobile phone, etc. The average experience of using any kind of mobile phone is 15 years, 15 years, and 8 years for respondents of the USA, Canada, and Bangladesh respectively.

### 5.1 Data Analysis

Although all the scale items were taken either from the UTAUT2 model with relevant revisions or from the recommendation of the focus group and pilot study with the help of literature review as mentioned before, the authors did a Confirmatory Factor Analysis (CFA) for verifying grouping and the loading pattern of measuring scale items. The authors conducted a CFA for all eight determinants of behavioural intention of consumer's m-health adoption behaviour and behavioural intention itself. Since adoption behaviour is determined by only one item, no CFA could be conducted.

The authors have scaled the latent construct. All the constructs with measuring items showed an over-identified model and satisfied both the requirements of the CFA. Researchers argued that in the CFA, any factor that loaded less than 0.50 on the respective latent variable is not considered to be a meaningful contribution to that latent construct, and thus should be removed (Fornell et al., 1981; Kline, 2005). However, for effort expectancy, social influence, facilitating conditions, hedonic motivation, price-value, self-concept, and behavioural intention, all the reflective indicators have loading factors of more than 0.50 and fitted well in a single factor (shown in Appendix A). But for performance expectancy and waiting time constructs, one item from each variable, PE2 and WT3 respectively, were dropped due to their insignificant contribution based on the loading factor value (less than 0.50). The authors have briefly verified some fit indexes, such as root mean square error of approximation (RMSEA), comparative fit index (CFI), normed fit index (NFI), and goodness of fit index (GFI) as the model fitness in the CFA for every latent construct (Kline, 2005). Since in the CFA, the authors only retain the scale items for each construct if the average variances extracted (AVE) for each factor and its measuring items have a loading factor of at least 0.50; thus, the authors can assure convergent validity (Fornell & Larcker, 1981). We also observed discriminant

validity among the eight constructs as the largest shared variance between these factors that is lower than the least AVE value for each factor and its measures (Espinoza, 1999).

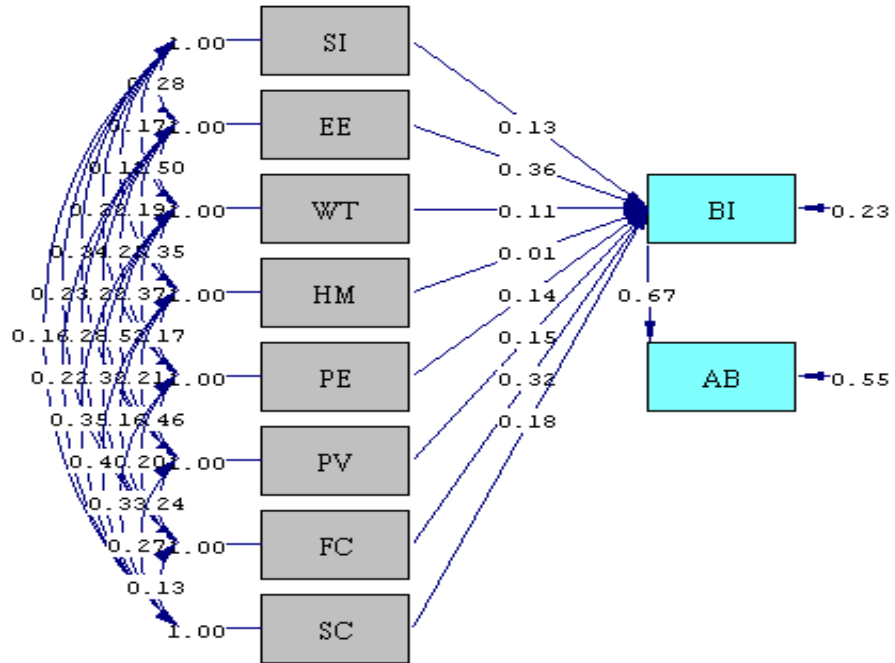
The authors examined the reliability of the constructs through Cronbach's alpha for the three samples. Since the coefficient alpha for all the eight formative determinants of behavioural intention of m-health adoption and behavioural intention itself scored from 0.819 to 0.955, the authors claimed the constructs' reliability (Nunnally & Bernstein, 1994).

### *5.2 Statistical Verification of Causal Relationship by Path Analysis*

The authors have used LISREL for the Path Analysis, which is a family of SEM to test the causal relationships of the model, i.e. the hypotheses. The authors used the maximum likelihood procedure of LISREL for the Path analysis. For the Path Analysis, the authors used the correlation matrix as the input data for all the exogenous and two endogenous variables.

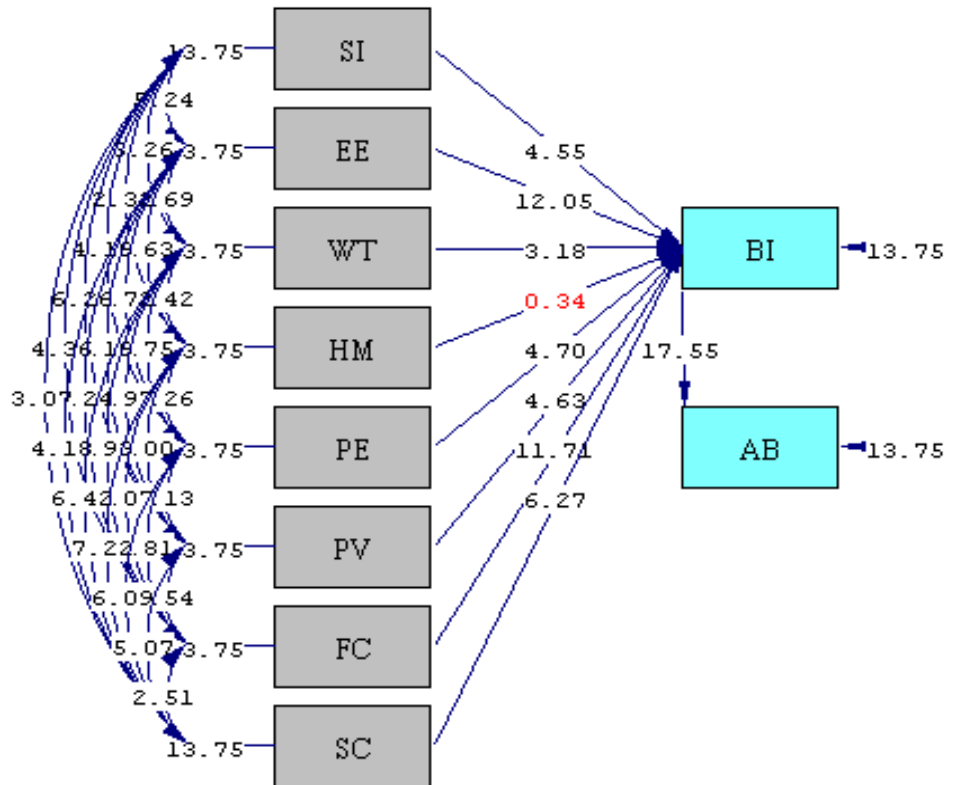
### *5.3 Path Model: USA*

The path diagram displays both the unstandardised and standardised regression weights (factor loadings) for the exogenous variables. After three iterations with inclusion of several error covariance among the determinants of behavioral intention of m-health, the authors accepted the final model for the USA sample. The authors have checked the 't' values for all the exogenous variables. They found effort expectancy, facilitating conditions, social concept, price value, performance effort, social influence, and waiting time are significant on behavioural intention leading to m-health adoption behaviour. Behavioral intention is significant on adoption behaviour of consumers for m-health at the 0.05 level (z score for 0.05 level is 1.96). Even these factors are significant at 0.01 level (z score for 0.01 level is 2.576). Hedonic motivation is non-significant at the 0.05 level, even at .10 level (z score for 0.1 level is 1.645). The path coefficients for this non-significant factor are very low. So, the hedonic motivation factor does not appear to have any relationship with the behavioural intention to adopt m-health leading to consumers' adoption behaviour and explains practically no variance in the acceptance behaviour of m-health. The standardised path coefficients, Chi-Square statistic, degree of freedom (df), p-value, and RMSEA are shown in Figure 1A (at 0.05 level) and 't' values in Figure 1B. The  $\chi^2$  statistic of 16.15 (df = 8) indicates that the null hypothesis of the model is a good fit for the data, or at least cannot be rejected. The root mean square error of approximation (RMSEA) (.052) and 90 per cent confidence interval for RMSEA (0.011; 0.088) are quite reasonable as goodness of fitness (Hu and Bentler, 1999; Kline, 2005, pp.133-144). Other fit measures such as CFI, IFI, RFI, GFI, AGFI, NFI, and NNFI indicate 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.



Chi-Square=16.15, df=8, P-value=0.04032, RMSEA=0.052

**\*Figure 1A: Citizens' Adoption Behaviour Model of m-health (Path coefficients) (USA)**



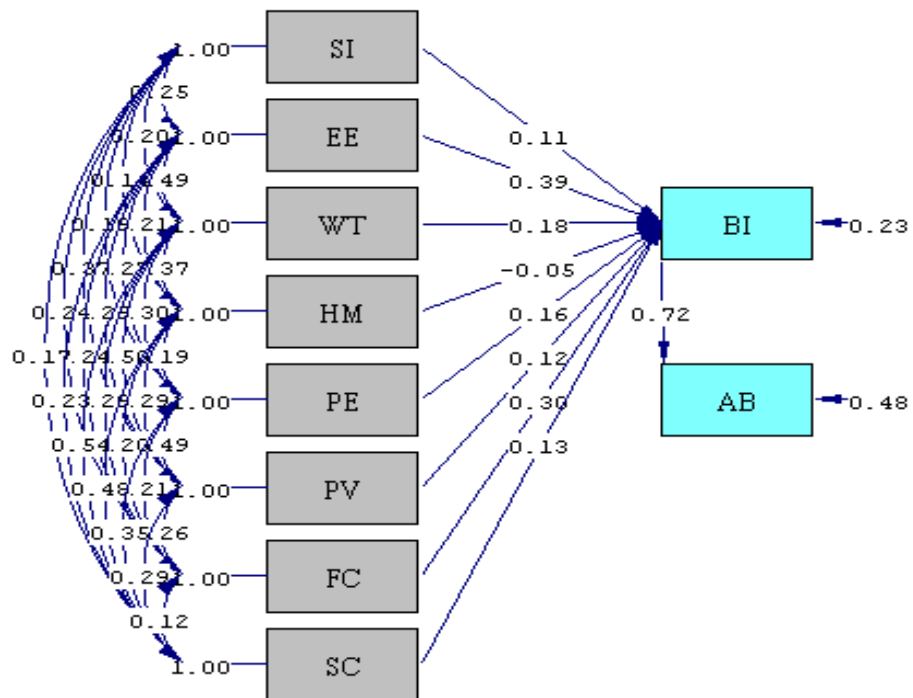
Chi-Square=16.15, df=8, P-value=0.04032, RMSEA=0.052

**\*Figure 1B: Citizens' Adoption Behaviour Model of m-health ('t' values) (USA)**

**\*Legend for Figure 1A and 1B:** 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 = Behavioral intention; AB = Adoption behavior

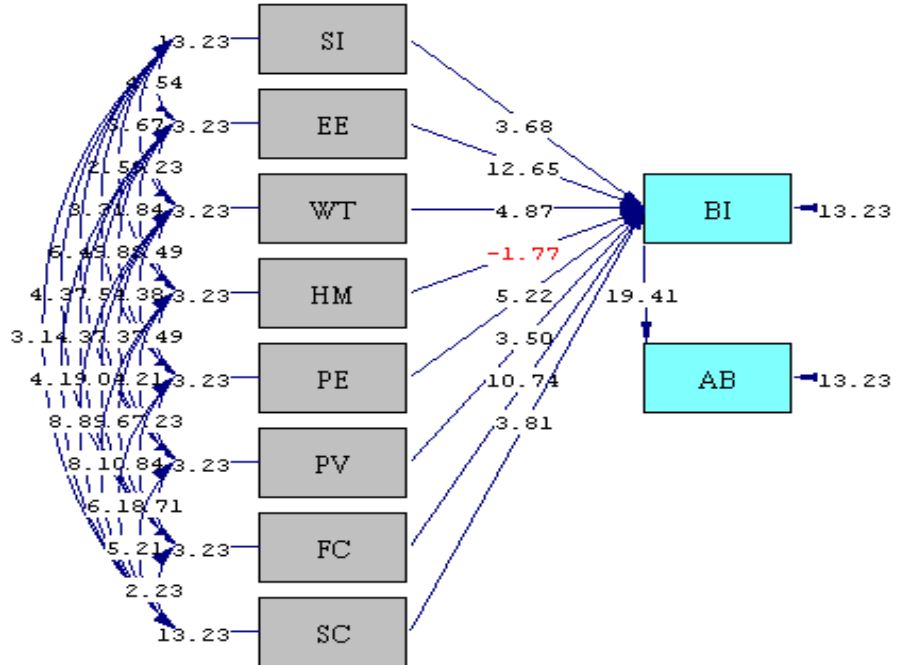
*5.4 Path Model: Canada*

Following the same procedure, the final m-health adoption model for the Canadian sample is shown in Figures 2A and 2B. 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.



Chi-Square=12.92, df=8, P-value=0.11467, RMSEA=0.042

**Figure 2A: Citizens' Adoption Behaviour Model of m-health (Path coefficients) (Canada)**



Chi-Square=12.92, df=8, P-value=0.11467, RMSEA=0.042

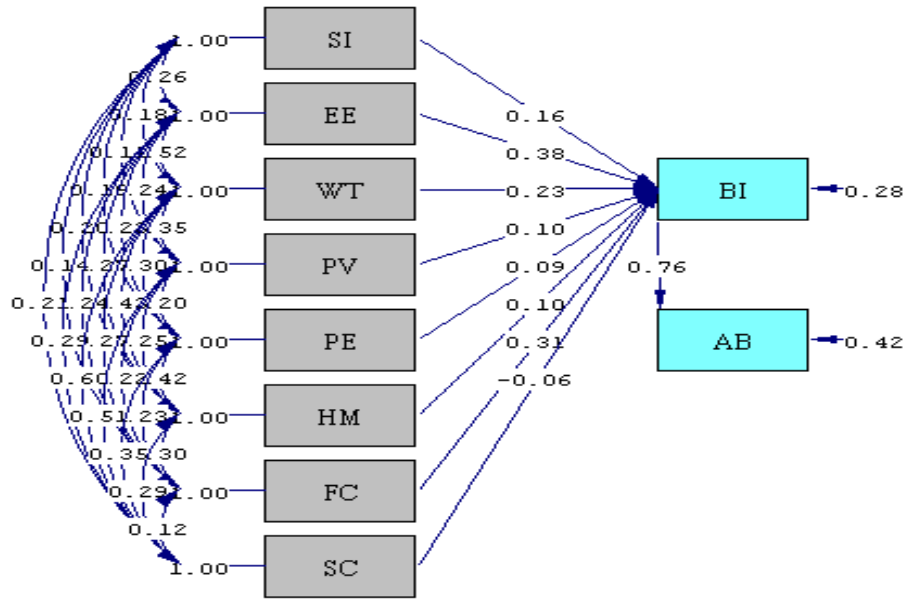
**Figure 2B: Citizens' Adoption Behaviour Model of m-health ('t' values) (Canada)**

**\*Legend for Figure 2A and 2B:** 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 = Behavioral intention; AB = Adoption behavior

*5.5 Path Model: Bangladesh*

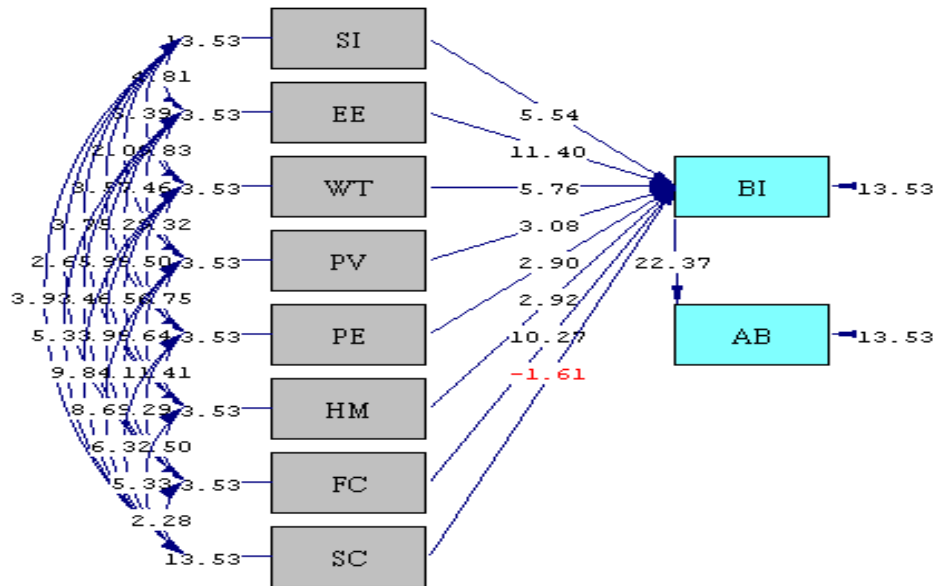
Following the same procedure, the final m-health adoption model for the Bangladeshi sample is shown in Figures 3A and 3B. For Bangladeshi citizens', adoption behaviour is significantly different with different levels of contributions of different determinants to

predict usage behaviour. The different model fit indices are shown in Table 1.



Chi-Square=13.58, df=8, P-value=0.09331, RMSEA=0.044

**\*Figure 3A: Citizens’ Adoption Behaviour Model of m-health (Path coefficients) (Bangladesh)**



Chi-Square=13.58, df=8, P-value=0.09331, RMSEA=0.044

**\*Figure 3B: Citizens’ Adoption Behaviour Model of m-health (‘t’ values) (Bangladesh)**

**Legend for Figure 3A and 3B:** 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 = Behavioral intention; AB = Adoption behavior

**Table 1: Citizens’ Acceptance Behaviour for m-health: Model Fitness Values for USA, Canada, and Bangladesh**

Fit Measures	Recommended	Citizens’ Adoption Behaviour
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	<b>Values</b>	<b>USA</b>	<b>Canada</b>	<b>Bangladesh</b>
Chi-square ( $\chi^2$ )	$p \geq 0.05$	16.15 (0.04032)	12.92 (0.11467)	13.58 (0.09331)
Degrees 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

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.

**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	<b>1</b>	Significant	0.39	<b>1</b>	Significant	0.38	<b>1</b>	Significant
Facilitating conditions	0.32	<b>2</b>	Significant	0.30	<b>2</b>	Significant	0.31	<b>2</b>	Significant
Social concept	0.18	<b>3</b>	Significant	0.13	<b>5</b>	Significant	-0.06	<b>8</b>	Non-Significant
Price value	0.15	<b>4</b>	Significant	0.12	<b>6</b>	Significant	0.10	<b>6</b>	Significant
Performance effort	0.14	<b>5</b>	Significant	0.16	<b>4</b>	Significant	0.09	<b>7</b>	Significant
Social influence	0.13	<b>6</b>	Significant	0.11	<b>7</b>	Significant	0.16	<b>4</b>	Significant
Waiting time	0.11	<b>7</b>	Significant	0.18	<b>3</b>	Significant	0.23	<b>3</b>	Significant
Hedonic motivation	0.01	<b>8</b>	Non-Significant	-0.05	<b>8</b>	Non-Significant	0.10	<b>5</b>	Significant
Behavioural intention	0.67	Not Applicable	Significant	0.72	Not Applicable	Significant	0.76	Not Applicable	Significant

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 social 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, social concept is also a determinant for behavioural intention, and for Bangladeshi 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 consumer citizens' preference and technology adoption behaviours. The UTAUT is a general model to conceptualise adoption behaviour for ICT-related artefacts (see Venkatesh et al., 2003). Nevertheless, in the consumer context, this model's refinement is imperative to capture the marketing aspects of technology adoption, and thus the authors proposed the UTAUT2 model (Venkatesh et al., 2012). However, this present study of m-



health, as an alternative channel of service delivery, explored citizens' preference for behavioural intention. This led to final acceptance behaviour and also further accomplished the distribution channel preference from the citizens' perspective and behavioural traits by projecting the product image. Finally, for m-health, it is a revolutionary system to offer a flexible health-care service on-the-spot at any remote place at any time continuously with the help of wireless technology maintaining a daily professional routine. It is a comprehensive model integrating technological, behavioural, and consumer preference channel selection behaviour for adoption of m-health with eight determinants established. The authors finally concluded that effort expectancy, performance expectancy, facilitating conditions, and social influence (from the UTAUT model with revised definitions of the constructs), price-value (from the UTAUT2 model) and waiting time (from a channel preference aspect) are the significant determinants of citizens' behavioural intention to adopt m-health which would lead to the final adoption behaviour. In addition, for USA and Canadian citizens, social concept (from the behavioural traits congruency with products) is a potential factor in predicting behaviour which is not common for Bangladeshi citizens. But for Bangladeshi citizens as the UTAUT2 model proposed, hedonic motivation is a significant factor unlike the USA and Canadian citizens, which means that cultural differences have a decisive impact on modelling adoption behaviour.

This finding can provide certain administrative direction to the policymaker of m-health. It is clearly evident that due to some obvious constraints of m-health like security and privacy including authenticity, this mobile healthcare service system faces challenges. So, the service providers must meet patients' different service output requirements from this dynamic mobile health service. These requirements are clearly articulated through the revelation of antecedents of m-health for three groups of consumers having different cultural traits. Policymaker of m-health can also understand that patients as consumers have also some genuine economic aspects of accepting this revolutionary service like value exchanged by price and waiting time (a potential service output from any distribution channel). While designing m-health service, these parameters can provide explanatory knowledge to the policymakers.

Policymakers also get potential outlook from understanding of the difference of the consumers having different cultural orientation. For Bangladeshi consumers where Electronic-government is a new paradigm unlike to consumers of USA and Canada, hedonic motivation is also a pursuing factor to accept m-health. On the other hand, consumers having individualism trait are more concerned of self-concept. This finding suggests policymakers of m-health that this mobile healthcare service system should be implemented with features reflecting that country's cultural traits. It means, generalized business model for m-health is not feasible.

### *6.1 Implications for ICT*

As Venkatesh et al. (2003) claimed, ICT researchers so far have been using different scattered behavioural theories to capture the fragmented adoption behaviour. The UTAUT model provided an integrated insight to capitalise on the overall behavioural intention leading to final usage behaviour. m-health, as a revolutionary and modern alternative health service providing system, is an explicit illustration of ICT adoption behaviour. So, ICT researchers could be assured that all the determinants of the UTAUT model can capture pure ICT adoption behaviour quite appropriately which is applicable for any consumers having distinct cultural traits. There are two important aspects where ICT-related policymakers should be focused for predicting and designing users' behaviour. First, pure ICT behaviour may not be fully dependent on cultural differences, although researchers (Pavlou & Chai, 2002) claimed with serious doubt that cultural traits found in Hofstede's model have an enormous effect on adoption behaviour. The second issue is more complex. If any ICT issues are intertwined with marketing behaviour where consumer preference shows a pure marketing attitude, a generalised behavioural intention is not expected to capitalise on the complete adoption behavior. Cultural differences might play a significant role in modelling adoption behaviour which can distort a unique theory development.

### *6.2 Implications for Medical Professionals and Policy-makers*

This research has profound implications for medical professionals as this kind of research captures consumers' cognitive, affective, and conative attitude and will shape their behaviour for m-health. It is a completely new and exploratory in nature. It has confounding importance for planning and designing the professional health-care service through this mobile channel for patients who are located in remote places.

Like any general technology where self-service has utmost importance, the consumers' perception about their own ability to use the system easily as represented by effort expectancy has an enormous contribution in pursuance to consumers' behavioural intention which has been recognised by several studies (Kim et al., 2008; O'Cass & Fenech, 2003). However, for m-health, where the systems' accuracy and authenticity largely depends on the users' self-ability to operate the wireless technology, monitor data, and interpret results as it is operated from remote places, the consumers' personal ease to use the system has a substantial effect on forming behavioural intention. Consequently, for all three countries, the authors revealed that effort expectancy has the highest contribution in forming behavioural intention. The complete service system is provided through this mobile remote channel and should have enough supporting environments, tools, and technology with reliability. It should be trustworthy in the consumers' perceptions as facilitating conditions have the second highest contribution in developing consumers accepting behaviour for m-health. Since patients can seek m-health from anywhere, even in remote unreachable places, patients can continue their regular daily and professional work pattern. This health-care service system increases the professional performance. Expectedly, m-health would have more scope to become popular among busy professionals, or at least those who cannot afford to take the day off from their jobs. The performance expectancy determinant indicates this human behaviour where compatibility of the system with the life pattern is the key issue. As social influence is a

key determinant of behavioural motivation toward accepting m-health, influence of the reference group is the driving force for this alternative channel. Medical professionals should be aware that to create an appeal among health service consumers, they might advertise using aspirational reference groups like celebrities and associative reference groups. However, since the health service is a vulnerable issue of cognitive belief. In this aspect, by following a cognitive response model (Greenwald, 1968) policymakers should be careful about counter-arguments, support arguments, and source derogations in the advertisements. All these aforementioned behavioural beliefs are captured by the UTAUT model.

Waiting time is a generic characteristic of m-health, and medical professionals should be aware that if the pattern of sickness needs to be repeated by a visit to a hospital, citizens as consumers may prefer this alternative channel due to less time consumption in m-health. However, based on a country's infrastructure, transportation system, and availability of medical professionals and scarcity of resources, this behaviour determinant might have a different degree of importance. In the light of distribution management following a transaction cost analysis and social exchange theory, consumers definitely compare 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; Wua et al., 2012) 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 et al. (2003) recognized 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 behavior. 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 artifacts 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 artifacts. 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 the delivery of such health services. This would lead to more holistic and context specific understanding of the adoption behaviour and its antecedents.

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## APPENDIX A

### Questionnaire and Factor Loading of the Measurement Items from the CFA

Item	Loading
Social Influence (SI)	
SI1. People who are important to me think that I should use mobile health.	0.599
SI2. People who influence my behaviour think that I should use mobile health.	0.641
SI3. People whose opinions that I value prefer that I use mobile health.	0.627
Effort Expectancy (EE)	
EE1. Learning how to monitor self-health issues through mobile health is easy for me.	0.743
EE2. My interaction with medical professionals through mobile health is clear and understandable.	0.567
EE3. I find mobile health easy to use.	0.512
EE4. It is easy for me to become skilful at receiving, monitoring and interpreting health-care data through mobile health.	0.722
Waiting time (WT)	
WT1. The use of mobile health can save my hospital waiting time.	0.856
WT2. I can get more time to do my daily tasks using mobile health.	0.90
WT3. Mobile health can save my time for continuous use. (Dropped)	0.465
WT4. Using mobile health is less time-consuming.	0.720
Price-Value (PV)	
PV1. Mobile health is reasonably priced.	0.546
PV2. Mobile health is good value for the money.	0.590
PV3. In terms of price, mobile health provides good value.	0.587
Performance Expectancy (PE)	
PE1. I find mobile health useful in my daily life.	0.788

Item	Loading
PE2. Using mobile health from anywhere increases my chances of achieving things that are important to me. (Dropped)	0.401
PE3. Using mobile health helps me accomplish my daily tasks more quickly.	0.702
PE4. Using mobile health increases my professional performance.	0.888
Hedonic Motivation (HM)	
HM1. Using mobile health is fun.	0.731
HM2. Using mobile health is enjoyable.	0.746
HM3. Using mobile health is very entertaining.	0.701
Facilitating Conditions (FC)	
FC1. I have the secured and trusted resources necessary to use mobile health.	0.505
FC2. I gathered the knowledge necessary to use mobile health.	0.614
FC3. Mobile Internet is compatible with my daily routine.	0.875
FC4. I can get reliable help from medical professionals when I have difficulties using mobile health.	0.722
Social concept (SC)	
SC1. I like mobile health.	0.742
SC2. I prefer mobile health.	0.514
SC3. I feel adherence with mobile health characteristics.	0.587
SC4. My personal behaviour is congruent with the mobile health image.	0.715
Behavioural Intention (BI)	
BI1. I intend to use mobile health in future.	0.723
BI2. I will always try to use mobile health in my daily life when I need continuous service from medical professionals.	0.743
BI3. I plan to inform my friends and relatives to use mobile health.	.812
Adoption behaviour (AB)	
AB1. I am adopting the system of mobile health.	Not conducted