



Understanding the Determinants of Wearable Fitness Technology Adoption and Use in a Developing Country: An Empirical Study

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ABSTRACT

On account of slow adoption rate of Wearable Fitness Technology (WFT), the device designers need to comprehend the determinants behind the adoption and use of WFT. Which antecedents affect the intention of WFT wearers remains unclear and a brainteaser for designers, especially in developing countries. This study, therefore, examined the factors liable to influence the WFT users in a developing country using the extended 'Unified Theory of Acceptance and Use of Technology' (UTAUT2) model and 'Perceived Reliability'. The desired data for assessment the model was assembled from 260 Bangladeshi respondents using a self-administered questionnaire through online platforms. The Partial-Least-Squares-Structural-Equation-Modeling (PLS-SEM) technique was followed by operationalizing SmartPLS 3.3.3 software to test the proposed hypotheses mentioned in the model. The outcomes of the test confirmed that the facilitating conditions and habit are the most influential determinants for intention-to-use and actual use of WFT followed by performance expectancy and facilitating conditions respectively. Contrariwise, effort expectancy was unearthed to have no notable impact on behavioral intention whereas price value showed negative association with intention. The documentation of the findings could benefit WFT vendors and those policymakers who have strong desire to enter in developing countries' market.

Keywords: Wearable Fitness Technology (WFT), UTAUT2 model, Technology Adoption Developing country

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INTRODUCTION

Fascination for wearable fitness tracker is burgeoning day by day which evoked and motivated health-conscious people to monitor, store and transmit their health-related information to keep the body physically fit and attain health goals (CTA, 2013). A survey carried out in 2020 by the American College of Sports Medicine opine that wearable devices are going to be the indispensable part of the health-conscious people during the forthcoming decade (Thompson, 2019). Market research report notified that the global market for wearable technology is projected to flourish to \$51.60 billion by 2022 which was reported \$15.74 billion in 2015. The wearable tech market continues to elevate at an unparalleled rate of 15.51% from year 2016 to year 2022 (Markets and Markets, 2017), which means that this wearables market push upward a significant number of smartphone vendors to penetrate in this market. A new market research report circulated by Meticulous Research anticipated that by 2025, the compound annual growth rate of 11.3% drive this market to reach \$62.82 bn. A study performed by Statista (2020) point out that the total number of figures who use fitness devices under the umbrella of 4G network was 526 million in 2017 which is probable to turn into 900 million real users in 2022. This recommends that these wearable devices are now acting as an indispensable part of modern lifestyles.

A tiny hardware which is installed in these digital trackers, includes an apps to check the physical fitness and monitor the lifestyles of users, such as these devices are used for counting the steps taken, measuring overall distance travelled, monitoring heart rate, calculating calories burned each day while walking or exercising, checking quality of sleep and most importantly, providing reminder throughout the day (Kaewkannate & Kim, 2016). With the rising interests of consumer to stay active both physically and mentally, the fortune of wearables in upcoming year is very encouraging in the Internet of Things (IoT) arena. According to their functionality, there are three types of Wearable devices: 'notifiers' signal us about the world where we live; 'eyeglasses' make simulated realities watch by the user and 'trackers' install sensors to keep data (Lunney et al., 2016). Most of the times, the third kind of wearable devices, namely WFTs, are seen as wristbands; but sometimes they can come up as devices which can be attached in the body, ear buds, or may be smart fabric made outfit. Among many others forms of wearable devices available in market, the most used ones are smart wristband, smart watches, fitness trackers, Fitbit, Jawbone (Talukder et al., 2019). According to NPD Group (2014) wearable trackers have turned into an over \$0.33 billion industry at an eye-catching exponential rate. Users can watch their activities in the visual dashboards of these devices and

they can also follow-up their medical record and dietary condition by virtue of unique lifestyle apps.

Despite its efficacy, potency, ease of use and many other qualities that it claims to have, the intention to accept this kind of technology among customers fall behind far away if we compare their adoption rate with other well-known long-lasting technological devices (Chau et al., 2019). Though customers in Bangladesh is becoming more and more technology oriented (Sagib & Zapan, 2014), still the country is struggling hard to cope with the proliferate features of wearable technologies (Debnath et al., 2018). The reason for lagging behind in adopting WFT is insufficient understanding about users' motive in using wearable technology (Lewy, 2015; Li, 2016; Chau et al., 2019). Since the commercialization process of wearable technology in developing countries is still now observed in its preliminary stage, that's why, a good number of prior studies keep their focus on technical development, consequently the research for understanding of its diffusion process is inadequate (Kim & Shin, 2015; Lunney et al., 2016). Moreover, if customer display their snail-paced adoption rate for accepting IT product, technological development in that culture face a severe impediment. Therefore, to boost up the diffusion process, extensive marketing research regarding factors underlying intention-to-use of tech products are carried out which provides a deep intuitive understanding for addressing meaningful implications for firms (Dutot et al., 2019). In addition, Ledger & McCaffrey (2014) alleged that within half-year of purchasing a fitness device, roughly 30% of wearer don't use these devices again. A longitudinal study claims that within first week of owning a fitness tracker almost 25% users dismount their devices where 50% return their devices within the second week of the research period (Shih et al., 2015). For this reason, some researchers opine that effectiveness of wearable fitness devices is being seriously challenged (Patel et al., 2015). Therefore, to successfully increase the adoption rate in developing countries, we need to better realize the factors that play a pivotal role to their use and disuse. Further, Sagib and Zapan (2014) noted that shopper behaviors studies regarding technology adoption in Bangladesh is historically scant. This paper opted to use the UTAUT2 (Venkatesh et al., 2012) for understanding the determinants of intention to accept WFT and their use behavior to provide a fruitful insights to the policy maker, designer and marketer of these devices in developing country context.

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Different established models have been used for predicting the determinants coupled with the adoption of wearable fitness health technologies (Kim & Chiu, 2019; Lunney et al., 2016). The UTAUT is extensively employed in the domain of technology adoption research (Chauhan & Jaiswal, 2016; Parameswaran, Kishore, & Li, 2015; Šumak & Šorgo, 2016). Venkatesh et al. (2003) developed the UTAUT model with four independent variables, namely performance expectancy, effort expectancy, social influence and facilitating conditions. The UTAUT is an amalgamation of determinants that influence the behavioral intention and spell out the use of new technology. It is proven that the UTAUT has been postulating superior outcome than other technology acceptance models such as TRA, IDT, TAM, TPB etc. (Shiferaw & Mehari, 2019). Though the UTAUT model has the better explanatory power with explaining 70% of the variance respect to intention-to-use (Venkatesh et al., 2003), the model was designed for

investigating organizational technology acceptance. Further, researchers documented that the variables included in the UTAUT model might be inadequate determinants of technology acceptance and usage (Al-Mamary et al., 2016). Consequently, the UTAUT is further extended as UTAUT2 for investigating individual technology acceptance and use with additional three independent variables (price value, hedonic motivation and habit) in the original UTAUT (Venkatesh, Thong, & Xu, 2016). The UTAUT2 has shown better performance than the UTAUT with explaining 74% of the variance respect to intention and 52% in consumers' technology usage (Venkatesh et al., 2016).

Our study employed UTAUT2 since this model has been extensively used in health related technological research. However, the model is further extended incorporating the 'perceived reliability' (PR) variable in the model. Barua, Aimin, & Hongyi (2018) suggested that reliability of technology is an imperative basis that encourage the consumers to adopt or not to adopt technology. Alam et al. (2020) noted that PR is a major concern that encourage consumer to use health technology in Bangladesh. Further, Alam, Hu, & Barua (2018) also documented that the reliability of health care technology plays a commanding role in decision making process of Bangladeshi tech product users. On the other side, researchers in wearable fitness technology adoption and use also incorporated some other external variables in the original technology acceptance model depending on the different context of use (Kim & Chiu, 2019; Talukder et al., 2019). For instance, Talukder et al. (2019) incorporated 'compatibility' and 'innovativeness' as external variables in the Chinese context and found that they contribute significantly in adoption of wearable fitness technology. In the Korean context, Kim & Chiu (2019) combined two models namely, technology readiness model and technology acceptance model, for investigating sports wearable devices adoption by Korean customers. Lunney et al. (2016) extended the TAM incorporating 'subjective norm' in the model for exploring the US consumers' intention-to-use WFT. Based on the literatures about WFT adoption, this study considered to extend the UTAUT2 incorporating perceived reliability. Consequently, the proposed framework is presented in the Figure 1.

HYPOTHESES DEVELOPMENT

Performance Expectancy (PE)

PE mention the degree to which a person considers that by using a new innovative technology s(he) will be able to do a specific task (Venkatesh et al., 2012). It is found that PE triggers the intention of a user to accept a new-found technology (Alam et al., 2020; Lean et al., 2009). If new innovation become apparent as more expedient in executing specific performance in the daily and occasional life of customers, they put endeavor effort to grasp that new creation. (Martínez-Pérez et al., 2013; Alalwan, Dwivedi, & Williams, 2016). Prior research also point out that the impact of PE on behavioral intention to wear WFT is noteworthy (Gao et al., 2015). Therefore, from aforementioned argument, we propound the following hypothesis:

H₁: PE has a positive effect on individuals' behavioral intention to adopt WFT.

Effort Expectancy (EE)

EE signifies the extent of putting endeavor regarding usage and handle of a technology in a simple and easy-going fashion (Cimperman et al., 2016; Kohnke et al., 2014). The easy

accessibility of a technology positively correlated with the user's adoption behavior (Barua, Aimin & Akter, 2016), especially when a new innovation introduces or discover recently or already existing but seen, experienced or acquired for the first (Cimperman et al., 2016). That is, if consumers perceive that the new technology will not make their life burden, rather easy to learn, simple to operate and convenient to carry the technology make the life simple and easy-going, the firmness of adopting the fitness wearable will be strengthen in their life (Goulão, 2014). WFT is still relatively a new invention in developing countries like Bangladesh. It is, therefore, operationalize simplicity and easy accessibility have a substantial impact on end user to adopt WFT. In case of WFT, some studies confirmed that effort expectancy has a positive direct effect on consumer intention to use WFT (Gao et al., 2015). The above arguments make it possible to postulate the following hypothesis:

H₂: EE positively influences the behavioral intention to adopt WFT.

Social Influence (SI)

SI signifies the efforts undertaken by the important social groups who make an endeavor to change another person's belief system so that s(he) will readily admit the new-found technology (Zhang et al., 2017). SI proclaims that besides the opinions of peer groups, friends & family, colleagues, social networks have noteworthy dominance to propel the individual's decision to adopt new technologies (Tsu Wei et al. 2009). Consumers keep faith on the members of their immediate social circle for adopting new products (Venkatesh et al., 2003), i.e., the fitness wearable, especially, when they have insignificant experience of the related innovation. As stated, WFT is still a new concept in developing countries like Bangladesh, therefore, their adoption decisions are expected to be greatly influenced by others' suggestions, especially, when this kind of products would be comparatively new to them. Prior research suggested that SI has positive impact on users' intention to accept technology (Chiu & Tsai, 2014; Rasmi et al., 2018). Thus, the following hypothesis is postulated:

H₃: SI has a positive effect on behavioral intention to use WFT.

Facilitating Conditions (FC)

FC demarcated the point to which an individual perceives that physical and organizational structures provide adequate resources and support systems that are needed for operating a fitness-wearables technology (Venkatesh et al, 2012). Boontarig et al. (2012) also argued that FC has remarkable impact on intention-to-use and use of technology. Different functions are available in fitness wearables which vary among brands and technological platforms. Accordingly, consumers' opinions may vary across a number of devices. This is because, different configurations are available in WFT across the product category. Consistent with the UTAUT2 model, it is suggested that FC positively influences use and intention to use wearables. Therefore, the stated argument urges to develop the following hypotheses:

H_{4a}: FC has a positive influence on intention to use (BI).

H_{4b}: FC is positively associated with actual use of WFT.

Hedonic motivation (HM)

HM signifies the amount of perceived fun or pleasure resulting from using a technology (Venkatesh et al., 2012). Utilitarian motivation distinct WFT from other types of IT-related products, that's why, for experiencing personal amusement or

enjoyment, individuals seem to pay more attention to use these kind of devices (Gao et al., 2015). For example, by wearing the sensor, users can continuously examine their fitness-related metrics (Wei, 2014). Perceived enjoyment assists the end user to show more inclination to use these devices (Hew et al., 2015). Therefore, the following hypothesis was posited:

H₅: HM positively influences the behavioral intention to use WFT.

Price Value (PV)

PV can be defined in its essence as consumers' cognitive trade-off value between the perceived values of the technology and the cost incurred for using those (Venkatesh et al., 2012). From inclusion of price value in the UTAUT2, it is conferred that there exist a significant association between PV and behavioral intention (Arenas-Gaitán, Peral Peral, & Ramón Jerónimo, 2015). Study supports the view that PV play a strong role for capturing consumers' behavior to adopt WFT (Zhang et al., 2012), though, some WFT would be expensive to buy for price sensitive users (Gao et al., 2015). This suggests that in spite of higher price value, if wearers consider that total perceived benefits (TPB) of accepting a technology are higher than the total perceived cost (TPC), they show more interest to wear WFT (Talukder, et al., 2019). So, the researchers have speculated the following hypothesis:

H₆: PV is positively correlated with the intention to use WFT.

Habit (HT)

HT is a regular tendency or practice, people show spontaneously owing to accumulation of learning behavior (Venkatesh et al., 2012). Amoroso and Lim (2017) identified that delighted customers show an eagerness to accustomed behavior, which compel them to wear these devices incessantly. Chuang (2011) confirmed that HT is one of the most prominent antecedents of intention to adopt WFT. In previous studies, it is explored that HT have a positive effect on behavior intention and usage behavior (Baptista and Oliveira, 2015). We, therefore, hypothesize that:

H_{7a}: HT is positively associated with the intention to use WFT.

H_{7b}: HT positively influences the use behavior.

Perceived Reliability (PR)

Shareef et al. (2012) demarcated that PR is an inside feeling of wearers regarding how much s(he) have faith and self-reliance on a new innovation that the technology will execute a task more precisely and dependably. Gunawardana & Perera (2015) opine that PR is a vital dimension of perceiving appropriate service quality from the technology. Moreover, among other antecedents which act as a driving force for strengthening BI of an end user, PR is the prominent, finally which motivate him/her to wear the device (Sharma and Sharma, 2019). In prior studies, PR is recognized as a strong variable, which increase the volition power of users to wear WFT (Warrington, Abgrab, & Caldwell, 2000). By relying on the previous work, the following hypothesis is asserted:

H₈: PR is positively correlated with the intention to adopt WFT.

Behavioral Intention and Use Behavior (UB)

It has been experimentally proven that the dependent variable, BI is the best predictor of actually accept the technology by end user (Taylor & Todd, 1995). It refers to the extent to which a person has developed conscious plans whether s(he) will undertake some specific action in future (Venkatesh, 2010). Though it is difficult to observe behavioral intention of a user

invaluably, using a wearable provide a clear indication of a desired response undertaken by end customer (Reyes-Mercado, 2018). Furthermore, existing literature confirmed that there is a positive association between behavioral intention and actual usage behavior (Goulão, 2014; Cimperman et al., 2016) Therefore, causal link between behavioral intention and the wearable use can be hypothesized as:

H₉: BI is positively correlated with the actual use behavior of WFT.

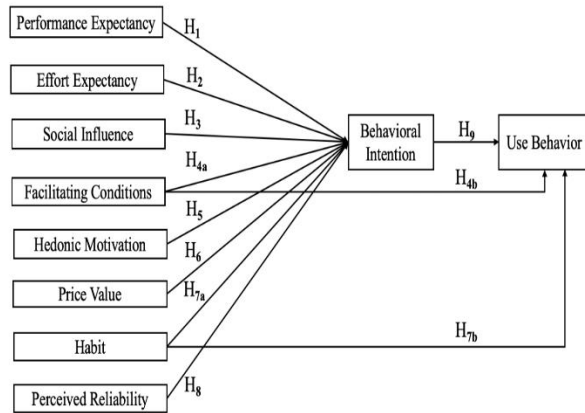


Figure1. Research Framework

METHODS

Instrument development

The instrument was designed based on the previously validated and extensively used scale to confirm the content validity for measuring the determinants of intention and use. Some items were faintly amended to fit the background of the study. However, the scales for measuring SI, PE, EE, and FC were adopted from Venkatesh et al. (2012) and Venkatesh et al. (2003). HM, PV, HT and BI were evaluated operating the scales of Venkatesh et al. (2012). PR was estimated adopting the scales of Gunawardana & Perera (2015); McKeenie, Ganguli, & Roy (2011); Walker et al., (2002). AUB was tested using the scale of Moon & Kim (2001).

Questionnaire Design, Data Collection, and Participants

The questionnaire was split into two parts - demographic profiles such as gender, age, education and occupation were incorporated in the first part and second part was assigned for representing the indicators of proposed model constructs. All the items of the instrument were assessed on 5-point Likert type scale that conveys '1- Strongly Disagree' and '5- Strongly Agree'.

The data was collected through a survey method with a purposive sampling technique considering the respondents willingness to participate in this survey. The questionnaire was developed on the Google Forms, and since the face-to-face interview was difficult in this ongoing COVID-19 pandemic situation, therefore, following the study of Barua et al. (2020), who suggested that online data collection procedure is best suitable in the pandemic situation, the questionnaire was distributed using email and social media networks such as messenger, WhatsApp, etc. The full rights were given to respondents to response the instrument according to their understanding on WFT to avoid the methodological bias of the study. Further, no incentive was provided to the participants for avoiding the biased responses. However, 260 responses were collected in total within a three-week period in the month

of December 2020. From them, 4 responses were deleted since their inability (due to the outliers and non-response problems) and finally, 256 responses were recorded for final analysis.

However, for determining the sample size, we used the recommendation of MacCallum et al. (2001). They noted that the ratio of respondents and factors of the model should be 20:1 or larger for adequately explaining the model (MacCallum et al., 2001). Therefore, the sample size of this study is quite representative since it is a ten-factor model which requires 200 sample size for assessing the model validation and testing the hypotheses.

Profiles of the Participants

Most of the respondents are found young and currently engaged in graduate and post-graduate education. Table 1 shows that 77.34% respondents fall in the age group 18 to 25 years and 84.76% are students. 54.68% of the respondents shows that they have the experience of using WFT for 1 to 2 years. Seniors citizen are very rare to use WFT in context of Bangladesh.

Table 1. Participants' characteristics

Variables	Frequen cy	%	Variables	Frequen cy	%
Gender					
Female	133	52.0			
Male	123	47.9	Education		
			SSC	04	1.56
Age			HSC	12	4.68
18-25	198	77.3	Honors	175	68.3
26-35	44	17.1	Masters	61	5
36-45	09	3.51	Others	4	1.56
46-55	05	1.97			
Professional Experience			Experience in Using WFT		
Student	217	84.7	Less than 1 year	45	17.5
Service	22	8.59	1- 2 years	140	54.6
Business	14	5.48	3 - 5 years	59	23.0
Freelance	03	1.17	More than 5 years	12	7
					4.68

DATA ANALYSIS AND RESULTS

The model of this study and proposed relationships between construct were investigated using Partial Least Squares-Structural Equation Modelling (PLS-SEM) technique. As a component-based tactic PLS-SEM is used for measuring reliability, validity known as measurement model and the relations between variables recognized as structural model (Cheng, & Yang, 2014). PLS is widely used as path modeling approach by the academicians and practitioners in the field of marketing and management due to numerous reasons. Requirements are fewer in PLS analyses compare to covariance structure analysis. First, for instance, compare to covariance-based SEM, a multivariate normal dataset is not required in PLS (Jain et al., 2012). Second, PLS increases the prediction quality of endogenous variables (Yi et al., 2013). Third, a dataset with small sample size is also recommended in PLS. The dataset of this study is comparatively small too but adequate for assessing the model. Fourth, PLS-SEM is more suitable for explorative study. The current study is also explorative in the sense that the UTAT2 model is extended with adding the external variable 'perceived reliability'.

Consequently, SmartPLS 3.3.3 software, as a technical means for PLS-SEM analysis, was employed for attaining the purpose.

Measurement Validation

Measurement model ensures that the instrument's items for individual variable are both reliable and valid for measuring the variables. Table 2 indicates that the Composite Reliability and Cronbach's Alpha values are of greater than 0.775 for all the constructs used in this study, where the threshold level is 0.70 (Fornell and Larcker, 1981). Cronbach's alpha, as superiority of PLS, measures the correlation among the variables instead

of measuring the absolute reliability of the variables where Nunnally (1967) suggested that 70% (PLS) composite reliability is an indication of an acceptable internal stability for the model and less than 60% PLS is inferred as the dearth of reliability. As next criterion for measuring the validity of the model, Table 2 shows that the AVE is more than 0.638 where it is suggested that the AVE larger than 0.5 denotes more than 50% of variance of all indicators can be described by the construct (Fornell and Larcker, 1981). Further, Table 2 demonstrates that the indicators' loading varied from 0.757 to 0.887. Therefore, convergent validity is established.

Table 3. Correlation Matrix

	1	2	3	4	5	6	7	8	9	10
1. BI	0.867									
2. EE	0.478	0.815								
3. FC	0.489	0.302	0.865							
4. HT	0.500	0.350	0.398	0.816						
5. HM	0.459	0.401	0.358	0.247	0.833					
6. PR	0.369	0.271	0.082	0.298	0.210	0.829				
7. PE	0.570	0.585	0.403	0.486	0.348	0.305	0.799			
8. PV	0.286	0.297	0.248	0.456	0.172	0.243	0.378	0.829		
9. SI	0.408	0.301	0.155	0.352	0.295	0.278	0.313	0.231	0.833	
10. UB	0.610	0.422	0.502	0.635	0.294	0.267	0.578	0.395	0.253	0.831

BI - Behavioral Intention, EE - Effort Expectancy, FC - Facilitating Condition, HT – Habit, HM - Hedonic Motivation, PE - Performance Expectancy, PV - Price Value, Si - Social Influence, UB - Use Behavior

Table 4. HTMT Ratio for Discriminant Validity

	1	2	3	4	5	6	7	8	9	10
1. BI										
2. EE	0.57									
3. FC	0.56	0.35								
4. HT	0.60	0.42	0.46							
5. HM	0.56	0.49	0.43	0.30						
6. PR	0.43	0.32	0.10	0.35	0.25					
7. PE	0.69	0.71	0.47	0.58	0.43	0.36				
8. PV	0.35	0.37	0.29	0.56	0.21	0.30	0.47			
9. SI	0.47	0.34	0.17	0.42	0.35	0.32	0.37	0.27		
10. UB	0.73	0.51	0.57	0.75	0.36	0.31	0.69	0.48	0.29	

Subsequently, the discriminant validity, that compares the different indexes of a variable with other variables' indexes in a model, was evaluated. Discriminant validity is considered to be acceptable if AVE is found higher than the common variance amongst a variable and other variable. Table 3 shows that the square root of the AVE is greater than the

ratios in Table 4 also shows that the model is discriminately valid. Therefore, obtained results for discriminant validity are acceptable.

respective correlation. Further, item cross-loadings for all constructs were reviewed and found that no item loads were greater on another variable than the variable it was intended to measure. Table 3 also denotes that all transverse values are higher than the off-transverse values in the respective rows and columns. Besides, heterotrait-monotrait (HTMT)

Table 2. Reliability and Convergent Validity

Constructs	Items	Loadings	Cronbach's alpha	CR	Average Variance Extracted (AVE)
Performance Expectancy	PE1	0.830	0.811	0.876	0.638
	PE2	0.774			
Effort Expectancy	PE3	0.780	0.831	0.888	0.664
	PE4	0.811			
	EE1	0.782			
	EE2	0.790			
Facilitating Condition	EE3	0.860	0.888	0.922	0.748
	EE4	0.825			
	FC1	0.879			
	FC2	0.879			
Social Influence	FC3	0.867	0.854	0.901	0.695
	FC4	0.833			
	SI1	0.887			
	SI2	0.850			
Price Value	SI3	0.835	0.775	0.868	0.687
	SI4	0.757			
	PV1	0.824			
Hedonic Motivation	PV2	0.866	0.780	0.872	0.694
	PV3	0.794			
	HM1	0.773			
Habit	HM2	0.849	0.832	0.888	0.665
	HM3	0.875			
	HT1	0.832			
	HT2	0.770			
Perceived Reliability	HT3	0.845	0.849	0.898	0.687
	HT4	0.814			
	PR1	0.845			
	PR2	0.858			
Behavioral Intention	PR3	0.798	0.834	0.901	0.751
	PR4	0.813			
	BI1	0.885			
Actual Use Behavior	BI2	0.861	0.850	0.899	0.691
	BI3	0.854			
	AU1	0.790			
	AU2	0.834			
	AU3	0.823			
	AU4	0.875			

Structural Model Evaluation

At this stage of analysis, this study assesses the proposed hypothetical relationships between the variables. Bootstrapping method with 5000 resampling size was operationalized for inspecting the relationships and the structural model' elucidatory power (Hair et al., 2011). The

scores of structural modeling are offered in Table 5 and Figure 2. The Table 5 indicates that the hypotheses – H₁, H₃, H_{4a}, H_{4b}, H₅, H_{7a}, H_{7b}, H₈, H₉ were significant. However, surprisingly, the relationships between PV and BI (H₆), and EE and BI (H₂) were insignificant.

Table 5. Hypotheses Confirmation

Hypotheses	Relationships	Beta	T-value	P Values	Comments
H ₁	PE -> BI	0.215	3.344	0.001	Confirmed
H ₂	EE -> BI	0.094	1.654	0.098	Rejected
H ₃	SI -> BI	0.140	2.449	0.014	Confirmed
H _{4a}	FC -> BI	0.228	3.499	0.000	Confirmed
H _{4b}	FC -> UB	0.188	3.668	0.000	Confirmed
H ₅	HM -> BI	0.159	2.779	0.005	Confirmed
H ₆	PV -> BI	-0.044	1.016	0.310	Rejected
H _{7a}	HT -> BI	0.161	2.424	0.015	Confirmed
H _{7b}	HT -> UB	0.402	6.513	0.000	Confirmed
H ₈	PR -> BI	0.151	2.796	0.005	Confirmed
H ₉	BI -> UB	0.317	4.415	0.000	Confirmed

R² and Q²

R² and Q² values indicate the explanatory power of a model. Hair et al., (2011) suggested that a model can be considered as weak, moderate, or strong if the R² values are 0.25, 0.50, or 0.75 respectively. The R² values obtained for BI and AUB in this model are 0.533 and 0.543 respectively, indicate moderate fit of the model. On the other, Stone–Geisser's Q² was checked for predictive relevance (Geisser, 1975; Stone, 1974). Blindfolding technique in SmartPLS was employed to measure the Q². The effect size is considered as small, medium, and large by the Q² value of 0.02, 0.15, and 0.35 respectively (Henseler, Ringle, and Sinkovics, 2009). This study revealed that the model has 0.043 predictiveness regarding BI and 0.034 predictiveness in case of UB.

unerringly investigated to capture an optimum level of acceptance among customers. In Bangladesh, the findings revealed that HT, FC, PE, PR, HM and SI have enormous impact on BI, whereas FC and HT have remarkably shaped the actual behavior of wearer. Unexpectedly, the influential power of EE and PV are not mentionable in case of WFT usage in Bangladesh. Wills et al. (2008) and Maillet et al. (2015) have also acknowledged its authenticity, though the result was mismatched with the findings of the UTAUT model. The most plausible reason behind this perhaps users are now quite accustomed with technology, e.g. smart phone. For this reason, they did not find that usage of WFT create any kind of challenge in Bangladesh. Since young generation constitute a great proportion of smartphone users' segment who have sufficient proficiency to operate the function of IT related products, therefore, they can smoothly run the WFT devices. Surprisingly, the results also show that PV has trivial impact on WFT adoption, perhaps because most of the WFT users pay more attention on intrinsic motivation of the devices. WFTs have some unique features in regard to task performances and personal entertainment different from other IT-related products which act as a catalyst to gain quick market access regardless of PV (Gao et al., 2015). Furthermore, Oliveira et al. (2016) found no significant relationship between PV and behavioral intention. Okumus and Bilgihan (2014) noted that the more and more HM experienced from using WFT, wearer would show more eagerness to use these devices due to the merriest nature of this sub-continent people. Therefore, HM was considered as a key determinant in prior research and its relevance also reported in this study (Venkatesh et al., 2003). Furthermore, if users put more weight on total perceived benefit derived from using WFT (Chan et al., 2012), in that case, the price issue is not essentially significant for WFT adoption.

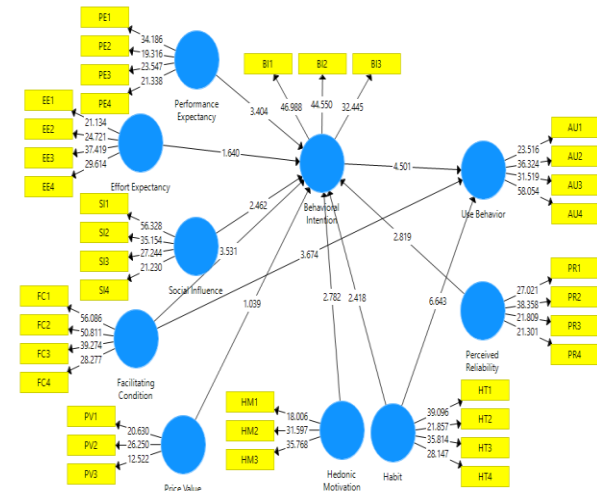


Figure 2. Structural Model and Hypotheses Testing

Discussions and Implications

Akin to the research questions and objectives of this study, the researchers conducted a quantitative analysis by using a modified UTAUT2 for better understanding of WFT usages behavior in a developing country like Bangladesh. Side-by-side PR is incorporated as an external predictor of WFT adoption. Aligning with the discussion in theoretical framework section and the findings of the result section, it is explored that different contributing factors affecting the intention-to-use and actual usage behavior should be

In contrast, HT produce a considerable impact on intention-to-use WFT followed by FC. This unquestionably point out that satisfied customers show an eagerness to habituate behavior, and hence they show more inclination for using these devices continually (Amoroso and Lim, 2017). Also, prior studies explore that HT is one of the most important antecedents of intention to adopt WFT (Chuang, 2011). Incessant use behavior makes a habit of wearers, as they are accustomed to

wear 24/7 to check their body fitness related health metrics e.g., measuring heartbeat, body temperature, steps taken, calories consumed etc. (Mackinlay, 2013; Mancuso et al., 2014), which in turn, forming their intention to adopt WFT. In addition, FC had a strong relationship on BI towards WFT in Bangladesh. Phichitchaisopa and Naenna (2013) and Aggelidis and Chatzoglou (2009) support this findings, which ensures FC have a vital role for adopting WFT by the end users.

In line with previous research related to WFT adoption (Gao et al., 2015), this study confirm that PE and SI were the strongest predictors of BI which suggests that perceived and considerable work-related benefits and the positive words-of-mouth of influential and important peer groups (Rana et al., 2017) may in fact motivate the adoption of WFT devices. The young generation is becoming more and more accustomed to social media, i.e., Facebook, Twitter, Youtube in where different reference groups acquainted with them spread positive word of mouth which significantly shape their attitudes in formulating their intention to experience a particular technology (Dwivedi et al., 2016; Sun et al., 2013). Since, in Bangladesh, usage of WFT devices is at the beginning stage, recommendations and experiences of early adopters shared in the social network would persuade the intention of potential wearers to adopt a new idea substantially (Alam et al. 2019). Moreover, consistent with prior research work, PR, the additional construct, was proven a robust determinant of increasing customer satisfaction toward a new innovation (Gunawardana and Perera, 2015) and wearers demand data shown in the dashboard of these devices should be more accurate, reliable and consistent over the time frame (Elliott et al., 2013). Therefore, PR is also considered as an important antecedent to inspire WFT wearers for wearing these devices. However, BI has remarkable impact on the actual usage behavior, which is consistent with previous studies conducted by Goulão (2014); Gao et al. (2015) and Cimperman et al., (2016).

Theoretical Contribution

In this study, we studied antecedents that are unique in molding the behavior of end user substantially to adopt a WFT device in a new environment (i.e. Bangladesh), mainly based on a more integrative model of UTAUT2 (Venkatesh et al., 2012). By considering PR, an important contributing construct in developing country context, this study provides invaluable insights on cause-and-effect relationship among the focal antecedents of BI and UB (PE→BI, FC→BI, FC→UB, SI→BI, HT→UB, HT→BI, PR→BI and HM→BI). This quantitative study discovered an interesting path relationship which makes a clear distinction from basic UTAUT2 model. Unexpectedly, EE→BI and PV→BI have trivial impact in case of WFT adoption in Bangladesh, due to close acquaintances with the configurations of smartphones and other IT-related products and perhaps the end user perceive that the prices set for these devices are quite reasonable. In addition, these kinds of devices relatively new in this market, which means that there is little information about this device and many people were unaware of the device should be considered.

Managerial Implications

Because of majority of customers reside in Bangladesh show their increasing attachment toward Self-service Technologies, WFT is expected to gain market acceptance at a fast pace. Vendors as well as device designers of WFT would get

valuable insights from this study, which they can exploit for designing these technologies in a new-fashioned way for the end users. However, the findings recommend that since Bangladesh is still in its infancy stage of making WFT available on the market, a deep intuitive understanding about the role of PR assist the vendors of WFT for alleviating perceived risk experienced by the end user, which in turn, motivate them to use these devices. Therefore, marketers should communicate proper information with consumers for educating them about the benefits of using these wearable devices (Andaleeb, 2015). The findings of this study also suggest that precise and accurate information about physical activity help consumers to construct PR on WFT. In that case, by eliminating consumers' fear arising from inaccurate data obtained from WFT, developers can inspire persons to keep faith on WFT and increase their physical activity level by continual monitoring their movement and by extension improve their fitness (Byambasuren et al. 2019). If consumers are convinced that the data obtained from WFT devices are accurate, their PR would be strengthened, in turn, acting as a strong force for adoption intention. However, WFT vendors need to envisage the role of PE, FC, HT, SI and HM for inducing the intention-to-use WFT in developing countries. Since PE and SI have noteworthy implication in molding the users' behavior in favor of marketing the product in developing countries, developers of WFT should install innovative features in these devices and to boost up the penetration of WFT, marketers should plan to undertake lucrative promotional strategies to properly educate the market (Andaleeb, 2015). In addition, by disseminating positive words of mouth of various persuasive reference groups in social media would multiply the market at an unprecedented speed (PWC, 2017; Mohamed et al., 2011). The aforesaid suggestions are expedient in fostering the acceptance intention of WFT among users.

Limitation and Future Direction of The Study

Like others, this study is not out of some limitations. For instance, this study considered only one external variable in the UTAUT2, but some other variables such as self-efficacy, lifestyles could also influence the consumers. Further, the model did not consider the any moderating variables in the model but it could provide some additional strong findings. This study collected data only from Bangladesh, hence generalizability of the model is restricted. Therefore, future study can conduct longitudinal surveys for better explanation of adoption and use behavior. However, the findings of the study would help the WFT designers to properly combine the determinants as suggested and also will help the marketers to initiate the proper marketing strategies.

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