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Empirical Validation of Intention to Use Fitness Tracker Band Using the Determinants of Unified Theory of Acceptance and Use of Technology (UTAUT) Model

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Abstract
Quantifying the parameters of health using innovative technology of Fitness Tracker Bands to monitor the activities that positively promote health is a lucrative idea. Irrespective of its potential to generate big data for health monitoring, wearable Fitness Tracker Bands' market is at a nascent stage in India right now. The UTAUT model has demonstrated usefulness in analysing the influencing factors for use of technology. However, in the context of Fitness Tracker Bands very little efforts had been done to determine the factors affecting the intention to use it. This study attempts to investigate intention to use Fitness Tracker Bands in adult population using key dimensions of UTAUT model on an empirical level, namely Performance expectancy (PE), Effort expectancy (EE), Attitude towards using technology (ATT), Social influence (SI), Value of money (V) for 185 responses validated. The study revealed that performance expectancy was found to have considerable influence on the intention to use Fitness Tracker Band. Further investigation of the influence of demographic variables as moderator variable on the intention of use with respect to key determinants of UTAUT model found that the social influence was the only factor which showed statistically significant difference between genders. It is expected that this research will shed new light on perceived usefulness as a basic concept underlying intention to use Fitness Tracker Bands in adults with the context of the Fitness Tracker Bands as health monitoring devices in a digital environment.

1. Introduction

Physical activity has demonstrated protection from chronic illnesses but various personal, behavioural and environmental factors inhibit person's ability to maintain a regular pattern of his activities. Health tracking is a way to motivate people to be proactive by empowering them to track fitness. The rise of non-communicable diseases (NCD) with the changing lifestyle have demanded measures to improve the stress coping capacity of the body for a healthy life. World Health Organization's reports on NCD considers physical activity as one of the modifiable risk factors for NCD. This physical activity can be tracked using Fitness Tracker Bands. These fitness trackers have entered their second generations by upgrading the tracking technology. The trackers

available earlier used to have a pedometer and pulse meter to track health parameters. With the advent of newer technology, the threshold level of these parameters can be set to give an indication and reminder about the targets to make fitness tracking accurate and motivating for the achievement of health. A wide range of fitness trackers available in the market offers a variety of features for health tracking with a reasonable price range.

Quantifying the parameters of health using innovative technology of fitness bands to positively promote health is a lucrative idea. Many mobile companies, technology giants and start-ups are entering this market segment with a cost-effective range of trackers to cater the need of young population of emerging economies. However, marketing strategies have projected these devices as technological devices focused on acceptance by innovators and early adopters segment of Technology Adoption Life Cycle model (TALC). Irrespective of the potential of these devices to generate big data for health monitoring in emerging grounds of NCDs the wearable devices market is at a nascent stage in India right now. The penetration of these devices in Indian market is much lower in comparison to markets like the US or China [1]. This implies that penetration into mainstream market is not significant to accelerate the market growth for the sales of fitness tracker bands. An article published on the potential of the fitness tracker band emphasise on the fact that these devices motivates people to stay fit by projecting people to be accountable for their own fitness [2].

2. Method

2.1. Research Model

Information technology (IT) acceptance research has yielded many competing models with determinants for identifying intention and usage of technology. The basic concept underlying these technology acceptance model is studying the relationship of individual reaction to using technology with the intention to use and actual use of it. The UTAUT model provides the factors that affect the intention to use technology. Unified Theory of Acceptance and Use of Technology (UTAUT) model developed by Venketasheh et al is the combination of 8 model studying relationship between consumer behaviour and intention to use innovative technology. This study used the acceptance determinants of UTAUT model to determine factors augmenting motivation to use fitness tracker by relating the intention to use fitness tracker with Performance expectancy (PE), Effort expectancy (EE), Attitude towards using technology (ATT), Social influence (SI), Price Value (V) of fitness trackers. The research further investigated the influence of other demographic variables as moderator variable on the acceptance of use with respect to acceptability determinants.

2.2. Literature Review

Technopedia defines an activity tracker is a type of electronic device that helps monitor some type of human activity, such as walking, running, sleep quality or heart rate. An activity tracker can be a smartwatch, or other small device linked to a local area network or otherwise connected to an IT system.[3].

Evolution of wearing technology can be traced back to Chinese mathematicians of 17 century who used abacus rings which allowed them to do mathematical tasks without technology. [4] The idea of first fitness tracking devices originated in counting steps by pedometer which was theorized by Dr Yoshiro Hatano, a Japanese professor at Kyushu University of Health and Welfare. He proposed that taking 10,000 steps each day would help combat obesity in his country and introduced a Manpo-kei pedometer in 1965.

According to International Data Corporation (IDC) in India, the market of fitness tracker shows a continuous fluctuation with the sales dropping in the last quarter of 2016 and showing a slow rise in 2017. Smartwatches continue to be a niche offering as they struggle to be a mass market device due to premium pricing and limited and unclear value proposition to a broad base of potential users. As the Indian wearable market is in the nascent stage, fitness tracker devices witness some growth in the short term but how this factor would evolve in terms of real-world use case would decide the future for this product category [5].

Online articles praise the capacity of fitness trackers to amplify the physical activity among adults by an ability to measure and motivate them. [6] Participants from a study conducted by Ashimakopoulos. S et al (2017) reported that fitness tracking enhances their motivation and willingness to undergo changes in their physical activity. The further qualitative analysis stated that the tracker makes the physical activity a gaming activity by aspiring to reach a daily step goal. [7] The study derives inspiration from various technology models applied to examine the use of fitness bands and to determine the factor facilitating the uptake of fitness bands in the various country. Huan-Ming Chuang applied the Structural Equation Modelling for parameter assessment and hypothesis testing of behaviour intention for using fitness devices (Mi band) as proposed by Theory of Planned Behaviour (TPB). The study uses the comparison between two groups of users (168) and nonusers (380) of the age 20 and above. Major findings from the study stated that attitude, social influence, effort expectancy and facilitating conditions have a significant impact on the users and nonusers. Also, the issue of technology belief was addressed as findings suggest that technology anxiety and novelty were the concern in nonusers as compared to users [8]. As Health is a much complex entity that is affected by complexity of subjective beliefs and perception of people, a qualitative analysis of components of Technology Acceptance Model was carried out by interviewing academicians and professional from IT sector. The result of the study stated that perceived usefulness is important for acceptance of wearable technology and the main reason for resistance toward these technologies were perceived IT security risk. [9] A study was conducted in China among 158

people for intention to use fitness bands. The study uses Partial Least Squares Structural Equational Modelling to evaluate hypothesis developed on acceptance determinants of TAM 2 and UTAUT model. The study further revealed that 70 of the respondents have never used fitness tracker bands but intend to do so in future and 53 never want to use it. The factors affecting the use of fitness tracking bands were perceived usefulness, social influence, affinity, and compatibility. [10]

Huang F et al (2015) conducted another study with the TAM to explore health anxiety and acceptance of smart wearable devices on 163 people attempting the marathon in Taiwan. The result of the study revealed that perceived ease of use, perceived usefulness and health anxiety had a significant impact on attitude to use smart bands. The study also discussed that lack of awareness among the common public about functions of fitness trackers is one of the barriers in acceptance of fitness bands. The study further suggests promoting the positive attitude about health anxiety towards using technology, by devising effective means to communicate health cognitive of technology which can increase the acceptance of fitness bands. [11]

Few studies that analysed the marketing strategies that are to be implemented in developing countries for making fitness bands acceptable to masses state that fitness trackers should be positioned in consumers' minds as the adventure or a way to reduce stress and make exercise fun. Intention to use fitness trackers were related to performance expectancy, hedonic motivation, social influence and facilitating condition. This implies that consumers want to experience these devices with enjoyment and get benefit from utilizing these devices. [12]

Experts have also applied the chasm theory form Technology Adoption Life Cycle (TALC) to study the reasons for less acceptance of the fitness trackers by the general population. The reasons that the fitness devices makers have failed to penetrate in the mass markets is that there is a difference of psychographic profile of visionaries (early adopters) and a pragmatic segment of target consumers. This difference avoids diffusion of fitness trackers in the mass market. [13]

A PwC report 'The Wearable Future' studies the pattern of buying the wearable devices globally and makes a strong statement that "For wearables to succeed, they don't just need to deliver the right information—they need to deliver the right insight, and help transform that insight into action". This strongly shows the interrelationship of the perceived usefulness with the intention to use the fitness devices [14]. Spagnolli A et al (2017) have used Technology Acceptance Model (TAM) on smart -shirt, portable EEG system, and eye-tracking glasses and concluded that Perceived usefulness, perceived comfort, pleasantness, facilitating conditions, and attitude toward using technology are good predictors of acceptance and intention to use the wearable technology. [15]

2.3. Materials and Methods

2.3.1. Overview

The study used a quantitative approach to determine factors influencing intention to use fitness bands by using a survey. Considering similar studies in literature review the questionnaire was developed using the items of the factors used in the original UTAUT model after significant modification. The study was carried out using descriptive research design and non-probability purposive sampling method with a sample size of 200 respondents. The respondents were the students and alumni of a health management institute. The survey was conducted online by using the google forms. The questionnaire was mailed to the respondents on their respective email ids and were requested to participate in the survey. The google form link was mailed to about 200 respondents and they participated in the survey voluntarily. The survey was conducted from 5 June 2017 to 6 July 2017. Out of the total number of responses received, 185 completed forms were used for analysis. The study determined the viewpoint of the prospective user of Fitness Tracker Bands.

2.3.2. Measures

To measure the conceptual construct of the UTAUT model for the present study the instrument items were derived from the relevant previous researches and modified according to the context of Fitness Tracker Band. The items were measured using 5 point Likert scale with 1 as strongly disagree and 5 as strongly agree. The operational definition for the factor were derived from the studies of Moon. Y (2016) and Venkatesh V et al (2012). The operational definition of determinants of the UTAUT model that are used to design a questionnaire in this study are:

1. Performance expectancy: The degree to which utilizing fitness tracker band devices will provide benefits to consumers in attaining health goals.
2. Effort Expectancy: The degree of ease/effort associated with consumer use of fitness tracker band.
3. Social Influence: The consumers perceive that important people (e.g. family or friends) believe that they should use a fitness tracker band.
4. Price Value: It is the consumers' cognitive trade-off between the perceived benefits of the applications and the monetary cost for using them.
5. Attitude toward using technology: It is defined as an individual's overall effective reaction to using a system.
6. Intention to Use: The degree of willingness to use smart wearable devices in the future.

3. Results

The data analysis was done using the IBM SPSS 20 Version. This study analysed and tested reliability between multi-item scale on 21 measurement items using SPSS 20 statistics program to measure the internal coherence of all indicators in relation to the constructs. The Cronbach coefficient alpha value for the questionnaire is 0.848 (higher than 0.7), which is recommended for Principal Component Analysis. The demographic statistics of the sample is mention below in Table 1.

Table 1. *Demographical Statistics.*

Measure	Item	Frequency	Percentage
Gender	Male	111	60
	Female	69	37.3
	Prefer not to say	5	2.7
Age	21-30	175	95.1
	31-40	9	4.9
Employment status	Employed	31	16.8
	Pursuing studies	154	83.3
Awareness about features of Fitness Tracker band	Yes	64	34.6
	No	121	65.4
Ever used fitness Tracker band	Yes	38	20.5
	No	147	79.5

3.1. Factor Analysis for Intention to Use Wearable Devices

The study performed the exploratory factor analysis on the items of the questionnaire measuring the constructs of the research model. Factor extraction method was based on principal components analysis and Varimax rotation with Kaiser normalization. The result of factor analysis is shown in Table 2 below. The principal factors were extracted. The first factor was named as the Performance Expectancy, the second factor was named as the Social influence, the third factor was named as Effort Expectancy, fourth was Price Value and fifth was named as Attitude Towards using Technology. Each factor had its Eigenvalue greater that one and the cumulative variance of the factors were 63%.

Table 2. *Result of Exploratory Factor Analysis.*

Factors / Items	Performance Expectancy (Factor 1)	Social Influence (Factor 2)	Effort Expectancy (Factor 3)	Price Value (Factor 4)	Attitude (Factor 5)
I believe, using fitness tracker band would make it easier for me to become fit	0.841				
I feel, using fitness tracker band will enable me to accomplish my fitness targets	0.818				
I feel, using the of fitness tracker band will increase my awareness about my health status	0.770				
If I use the fitness tracker band I will increase my chances of doing exercise regularly	0.695				
I feel, Wearable fitness tracker band is relatively easy way to stay fit	0.652				
I feel, the information obtained from fitness tracker band would be useful for tracking the health & fitness	0.619				
Using fitness tracker band is an appropriate way to track fitness.	0.612				
I would look forward to exercise sessions that require me to use fitness tracker band	0.595				
Having the fitness tracker band is a status symbol in my circle.		0.791			
People in my circle who use the fitness tracker band look more stylish		0.754			
I will use the fitness tracker band if my friends use it		0.751			
People who are important to me think that I should use fitness tracker band		0.613			
I with my friends may achieve fitness target using fitness tracker band.		0.566			
If I use fitness tracker band, my friends will perceive me as health conscious		0.455			
I would like my fitness tracker band to represent data in an understandable way			0.782		
Do you think, fitness tracker band are compatible to all mobile platforms (Android/ IOS /window)			0.709		
I think the wearable fitness tracker bands are reasonably priced				0.751	
I am aware about type of fitness tracker band available in market				0.688	
I feel, continuous data monitoring of fitness tracker band would put me into stress					0.823
The fitness tracker band makes exercise more enjoyable					-0.565
Eigen value	6.824	2.014	1.361	1.243	1.178
Cumulative Variance	34.120	44.188	50.993	57.208	63.100
KMO	86.6%				

3.2. Regression Analysis

This study used multiple regression analysis by setting the intention to used fitness tracker band as dependent variable and Performance expectancy, Effort expectancy, Attitude Towards using Technology, Social influence, Price value as independent variables. The result of the analysis shows that the Performance Expectancy factor from the UTAUT model had statistically significant relation to the intention to use fitness trackers. These results resonate with the result of the study by Choi. J et al (2016) which showed that the perceived usefulness of smartwatch influenced an individual's attitude and consequently affected their intention to use a smartwatch in the near future. [12] This implies that the consumer intention to buy the fitness devices is based on the performance of the fitness tracker band and that the consumers will look at the features of the fitness tracker band before buying. Table 3 shows the results of the regression analysis.

Table 3. *Result of step wise regression analysis of intention to use and factors.*

Dependent Variable	Independent Variable	B	Standard Error	Beta	t	Significant	Statistically Significant
Intention to use fitness tracker bands	Constant	1.207	0.603		2.001	0.047	
	Performance Expectancy	0.078	0.019	0.433	4.185	0.000	Yes
	Social Influence	-0.004	0.021	0.016	-0.167	0.868	No
	Effort Expectancy	-0.019	0.054	-0.027	-0.342	0.732	No
	Price Value	0.055	0.052	0.074	1.046	0.297	No
	Attitude	0.024	0.061	0.026	0.389	0.697	No

3.3. Role of Demographic Characteristics

The second step in the study was to test the effect of the moderator variable. The t-test was used to evaluate the significance of difference on demographic characteristics of the respondent's, namely, gender, based on the mean scores for both the variables (independent and dependent). After applying the independent t-test, the result of the test shows that the social influence was the only factor which showed statistically significant difference between gender.

Table 4. *Result of t-test between Males and females.*

Factors	Levine's Equal variance		T-test on identify of mean	
	F	Alpha	t	Alpha (two tailed)
Performance Expectancy	2.224	0.138	0.216	0.830
Social Influence	0.011	0.917	2.328	0.021
Effort Expectancy	3.274	0.072	-0.944	0.346
Price Value	0.252	0.617	0.956	0.340
Attitude	0.022	0.882	-0.053	0.958
Intention to use	3.352	0.069	-0.837	0.404

4. Discussion

The use of UTAUT model to study the intention to use fitness band helps us to define the parameters on which the marketing strategies for these devices should be based on to reach a maximum number of consumers. The analysis of acceptance determinants of UTAUT model with respect to wearable fitness devices reveals that intention to use these devices is dependent on its performance expectancy in the context of this study. If wearable fitness tracker band are to be promoted as preventive and promotive health care devices, the strategy should focus on projecting technology in the device as one that will empower customers to monitor their health on their own. The customers should be informed about the features of the wearable devices and how these features are important and useful to maintain healthy habits. In India, the main reasons that the wearables have not reach mass population irrespective of their potential is that people have not completely perceived the usefulness of health tracking function of these devices.

The fundamental function of any wearable devices, in general, are sensing, processing, storing, transmitting and utilizing the data. S. Park et al have proposed a Data-Information-Knowledge-Value paradigm for wearables which says that data from these devices can add value only if the information from the device can improve the knowledge of users to promote action [19]. In context of the fitness tracker band we can say that these devices will be perceived useful only when the data collected by these devices will help the user to track his health and avoid sedentary lifestyle by promoting physical activity. Considering the Health Belief Model if Fitness Tracker Band can simplify the perceived benefit of the health tracking by defining how, when, where to take actions, it will increase the intention to use the Fitness Tracker Band for its perceived usefulness.

5. Conclusion

The study tries to use the components of the UTAUT model to explore the factors affecting the intention of using fitness bands among a group of adults. The factor analysis revealed that there are five factors that are closely related to the intention of using fitness bands they are Performance Expectancy, Effort Expectancy, Social Influence, Attitude Towards using technology and Price Value. Regression analysis of the factors obtained revealed that Performance expectancy has a significant relation to intention for using fitness bands. As performance expectancy is related to the knowledge of the features of the Fitness Tracking Bands marketing strategies should focus on the projecting these devices as the health tracking mechanisms which will empower the customer to be accountable for their health.

Limitation

1. Student sample of the survey includes specific background.
2. As the survey was not brand specific the respondents could express their views on the intention to use which were not brand specific.

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