The Adoption of Innovative Healthcare Wearable Devices in the Big City of Thailand

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Abstract

Healthcare wearable devices are a rapidly growing type of information and communication technology (ICT) that facilitates healthcare delivery. Despite the potential benefits of innovative healthcare wearable technologies, little is known about the important factors that influence individual adoption in developing countries. The purpose of this research is to bridge that gap by developing an integrative model that explains consumers' intentions to use healthcare wearable devices based on the UTAUT, consumer innovation, and health consciousness. A self-administered questionnaire was distributed. The data was collected from 566 respondents who were all owners of a healthcare wearable device. The proposed research model was tested using a Structural Equation Model (SEM). The obtained results from SEM indicated that performance expectancy, effort expectancy, social influence, consumer innovativeness, and health consciousness have a direct positive effect on the customer's intention to use healthcare wearable devices. This study will help business managers and social planners develop better policies and strategies to promote healthcare wearable device adoption in developing countries.

Keywords: Healthcare Wearable Devices, Unified Theory of Acceptance and use of Technology, Consumer Innovativeness, and Health Consciousness

Introduction

Healthcare wearable devices are an appealing and growing platform for healthcare services, especially given the growing interest in health, well-being, disease prevention, as well as the paradigm shift toward controlled healthcare by individuals (Chang,2020). Many technology companies have created innovative wearable devices to provide a wide range of healthcare services, and this trend is expected to continue (Reyes-Mercado, 2018). A healthcare wearable device is defined as a device that is self-contained, non-invasive, and performs a specific medical function over time, such as monitoring or support (Fotiadis et al., 2006). Smartwatches, bracelets, and rings are examples of healthcare wearable devices that can be worn on the body as an accessory or as part of clothing. These devices, which are embedded in a person's clothing or personal accessories, are capable of storing and processing data as well as allowing real-time data exchange between the device and a network. Healthcare wearable devices can detect physical conditions, use real-time perception, compare and analyze large amounts of data for analysis, interpretation, and response, and then choose the best current processing and support. Consumers can use the data collected by healthcare wearable devices to manage their health through smartphones or other mobile applications. Additionally, physical data collected via healthcare wearable devices can be transmitted to the hospital for additional monitoring and to expedite healthcare work (Lee & Lee, 2018).

Despite the significant benefits and functionality of healthcare wearable devices, there has been insufficient research into consumers' intentions and actual use of healthcare wearable devices in develop-

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ing countries (Asadi et al., 2019; Yang et al., 2016). It is necessary to develop an integrated framework that can comprehensively explain an individual's adoption of healthcare wearable devices. According to the International Data Cooperation (2021), Thailand's wearable technology shipments increased 47.3 percent year on year to 3.46 million units in 2020. Nowadays, customer health trends drive Thailand's wearable device market, as consumers demand additional health features such as blood oxygen measurement and electrocardiograms (International Data Cooperation, 2021). However, while many Thai people were interested in healthcare wearable devices, their adoption rate has not increased as expected (Statista, 2021). This demonstrates that there is a significant opportunity for the growth of healthcare wearable devices in Thailand (Euromonitor, 2021). Thus, it is vital to explore significant factors influencing consumers' intention to adopt healthcare wearable devices in developing countries. Thus, this study fills the gap in the existing literature by proposing and validating an integrative model to explain individuals' adoption of healthcare wearable devices in developing countries by extending the UTAT model with consumer innovativeness and health consciousness. The results of this study provide valuable insights and a deeper understanding of the success factors in improving consumers' acceptance of healthcare medical technology in Thailand. The structure of this paper is as follows. Following the introductory section, section 2 reviews relevant literature concerning mobile banking adoption. The research methodology of this study is discussed in section 3. The data analysis and results are discussed in section 4. In the final section, the discussion, conclusion, limitations, and future research suggestions are discussed.

Literature Review

The Unified Theory of Acceptance and Use of Technology Model (UTAUT)

The unified theory of acceptance and use of technology (UTAUT) model is an extension of the TAM that was proposed by Venkatesh et al., 2003). UTAUT has proposed four key constructs that have direct and significant effects on both behavioral intention and actual use: performance expectancy, effort expectancy, social influence, and facilitating conditions. Since its development, UTAUT has served as a research framework for numerous studies examining consumer technology acceptance and use across a variety of disciplines and technologies (Venkatesh et al., 2012).

Performance Expectancy

Performance expectancy refers to the extent to which using technology will benefit consumers in conducting certain activities (Venkatesh et al., 2012). In the context of healthcare wearable devices, performance expectancy can be defined as the device's ability to assist consumers in monitoring their daily physical conditions, making personal healthcare plans, and reducing health-related threats, among other things (Gao et al., 2015). Consumers are more likely to adopt healthcare wearable devices if they believe they will be able to increase this type of healthcare effectiveness (Harrington et al., 2013). Previous research has discovered that performance expectation is a significant predictor of wearable technology adoption (Gao et al., 2015; Hsiao, 2017; Reyes-Mercado, 2018). Therefore, the following hypothesis was developed.

H1 Performance expectancy positively affects consumers' intention to use healthcare wearable devices.

Effort Expectancy

Effort expectancy is defined as the degree of ease with which a system can be used (Venkatesh et al., 2003). In the context of healthcare wearable devices, effort expectancy is used to assess a consumer's perceived ease of use of these devices (Gao et al., 2015). Furthermore, several studies have proved that effort expectancy has a significant impact on healthcare wearable devices (Gao et al., 2015; Wang et al., 2014). In comparison to other emerging technologies, the operations of healthcare wearable devices are generally more complicated, as they require users to wear them all the time while also using other devices such as cell phones. Thus, effort expectancy is expected to positively influence consumers' adoption intention toward wearable devices in healthcare. Therefore, the following hypothesis was developed.

H2 Effort expectancy positively affects consumers' intention to use healthcare wearable devices.

Social Influence

Venkatesh et al. (2003) define social influence as the degree to which an individual perceives that his/her use of new technology is valued by others or that he/she conforms to others' expectations. Social influence is related to the effects of others' views and actions such as colleagues, friends, family, and social groups, on the behavior of a person. In the context of healthcare wearable devices, the majority of users make their adoption decisions based on recommendations from others, as this product is unfamiliar to them. Recent improvements in healthcare wearable devices allow consumers to engage with their healthcare providers and their social network. Social influence has a significant impact on how customers perceive technology, and its influence is strongly supported by previous studies on the adoption of health wearable devices (Gao et al., 2015; Kranthi & Ahmed, 2018; Yang et al., 2016). Therefore, the following hypothesis was developed.

H3: Social influence positively affects consumers' intention to use healthcare wearable devices.

Facilitating Condition

Facilitating conditions refer to consumers' perceptions of readily available resources and support when utilizing technology (Venkatesh et al., 2012). Facilitating conditions have been determined by the availability of knowledge and resources to consumers, either internally or through external partners. Consumers need to be assured that health care professionals can read and monitor the output of healthcare wearable devices. Furthermore, companies must provide clear instructions and guidance to both the device user and the health care provider analyzing the case based on the data provided (Lucassen & Jansen, 2014). Chang (2020) found that facilitating conditions influences behavioral intention to use healthcare wearable devices. As a result, we anticipate that facilitating resources, such as technical support and assistant, will have a positive impact on the desire to use healthcare wearable devices. Therefore, the following hypothesis was developed.

H4: Facilitating conditions positively affect intention to use healthcare wearable devices.

Consumer Innovativeness

Rogers and Shoemaker (1971) defined consumer innovativeness as the extent to which an individual adopts an innovation earlier than other people in their system. Roehrich (2004), on the other hand, defined consumer innovativeness as the likelihood that a consumer will purchase new products more frequently and faster than other users. Consumers who are more innovative are more likely to recognize the advantages of new technology products (Talukder et al., 2019). Consumer innovativeness is typically assessed on a multidimensional scale. Goldsmith and Hofacker (1991) developed a self-reported scale to measure consumer innovativeness, focusing on product areas that consumers frequently purchase. Tellis et al. (2009) measured innovativeness in three dimensions: openness to new products, enthusiasm for new products, and reluctance to use new products. Vandecasteele and Geuens (2010) created dimensions that focused on the motivation or reason for purchasing a new product. Furthermore, they claim that these motivating factors will have an impact on consumers' purchase intentions (Jeong et al., 2009; Vandecasteele and Geuens, 2010). These are the motivating factors:

• Functional consumer innovativeness (FCI) is a type of consumer innovation that is based on the functional performance of new products and is focused on improving task management and getting things done better (Vandecasteele & Geuens, 2010). The functional dimension is concerned with aspects such as instrumentality, efficiency, task-specificity, and practicality (Holbrook & Hirschman, 1982). Consumers choose a new technology product or service based on its functional benefits.

• Social consumer innovativeness (SCI) refers to consumer innovativeness motivated by a personality social need for differentiation (Vandecasteele & Geuens, 2010). Consumers frequently purchase products to improve their self-image in the eyes of others (Brown &

Venkatesh, 2005).

• Hedonic consumer innovativeness (HCI) refers to consumer behavior associated with the multisensory, imaginary, and artful aspects of one's experience with a product (Holbrook & Hirschman, 1982), such as enjoyment, pleasure, and excitement (Batra & Ahtola, 1990). As a result, people adopt innovations to satisfy their hedonic needs.

• Cognitive consumer innovativeness (CCI) can be defined as consumer innovativeness motivated by the desire for mental stimulation (Vandecasteele & Geuens, 2010). Consumers' desire for new technology stems from a desire to stimulate the mind, as new technology aids in the achievement of cognitive goals such as exploration, comprehension, and intellectual creativity (Vandecasteele & Geuens, 2010).

This study measured consumer innovativeness by following Vandecasteele and Geuens (2010). As illustrated in Figure 1, the consumer innovativeness construct consists of four dimensions: functional, social, hedonic, and cognitive. As a result, the following hypothesis was formed.

H5: Consumer innovativeness is a second-order dimension of four factors: functional, social, hedonic, and cognitive.

A consumer's innovativeness has an important influence on the intention to adopt a new technological product (Hirschman, 1980). Consumers with a high level of innovativeness are more likely to adopt a new technology sooner than those with a low level of innovativeness, and their personal level of innovativeness may influence their intention to adopt a healthcare wearable device (Lee & Lee, 2018). There is a dearth of research on the role of consumer inventiveness in determining the intention to use healthcare wearable devices in developing countries. Cheung et al. (2019) discovered that consumer innovativeness influences the intention to use wearable technology positively. As such, one could argue that consumer innovativeness is a strong predictor of adoption intention, particularly for new technology products such as healthcare wearable technology devices. As a result of these findings, the following hypothesis has been formulated:

H6: Consumer Innovativeness positively affects intention to use healthcare wearable devices.

Health Consciousness

Health consciousness is defined as the degree to which individuals are interested in and aware of their health conditions and well-being, as well as the degree to which a person maintains their health (Jayanti & Burns, 1998; Cho et al., 2014). People who are health-conscious are aware of and concerned about their health; as a result, they are motivated to improve and/or maintain their health. Health-conscious people are highly active in their search for information relevant to their health improvement, as well as in their use of

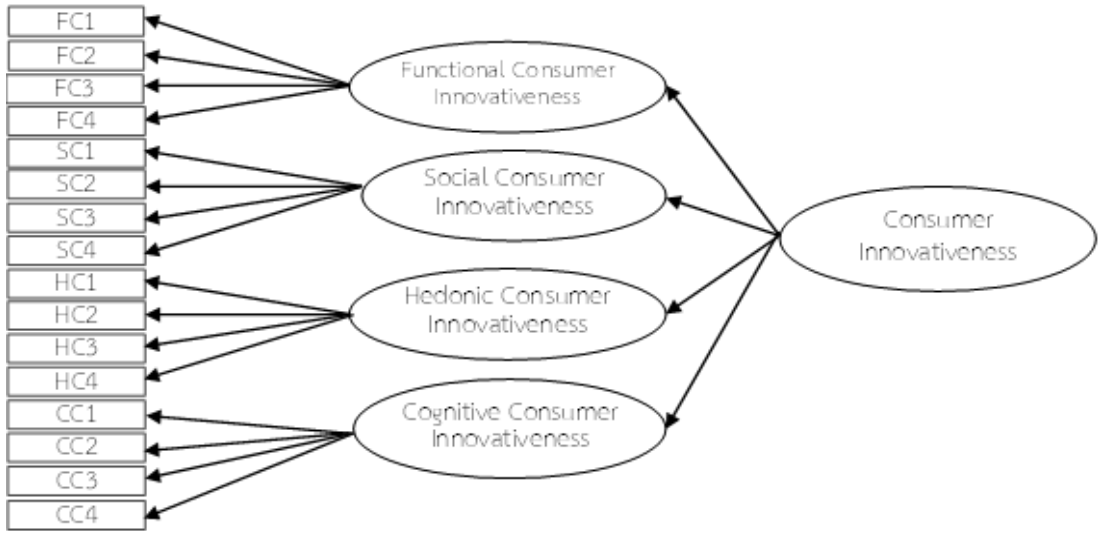

Figure 1 Consumer Innovativeness Construct

healthcare wearable devices (Basu & Dutta, 2008). Previous studies have shown a significant relationship between health consciousness and behavioral intention to use healthcare wearable devices (Cho et al., 2014; Chang, 2020). According to this research, consumers who are extremely health conscious are more likely to use technology to monitor their personal health. As per the above discussion, we posited the following hypothesis:

H7: Health consciousness positively affects the intention to use healthcare wearable devices.

Behavioral intention to use behavior

The term adoption intention refers to an individual's perception of his or her likelihood of adopting healthcare wearable devices (Venkatesh et al., 2012). Actual behaviors, according to the UTAT, are predictable and are influenced by individual intention (Venkatesh et al., 2003). Previously researchers established the relationship between the intentional and actual use of healthcare wearable devices (Li et al., 2016). As a result, the following hypothesis regarding actual usage behavior has been developed:

H8: Individuals' intention to adopt healthcare wearable devices positively affects their actual use of healthcare wearable devices.

To gain a holistic understanding of consumer adoption of healthcare wearable devices, this study develops a framework that incorporates UTAT, consumer innovativeness, and health consciousness. The aims of this study are to (1) identification of factors influencing adoption of healthcare wearable devices; (2) determination of whether the conceptual model built on UTAT and consumer innovativeness, as well as health consciousness, provides a strong theoretical framework for analyzing healthcare wearable devices adoption; and (3) validation that consumer innovativeness is composed of four dimensions. The study's conceptual framework illustrates in Figure 2.

Research Methodology

Sampling and data collection

This study applied a quantitative approach using survey questionnaires to test the research model. The purposive sampling technique was used in this study. Data was collected from consumers in Bangkok in the big city of Thailand who have experience in using healthcare wearable technologies. This study used a self-administered questionnaire as a research instrument. Individuals who are interested in participating will be given an information sheet with project details and the option to withdraw at any time. This research was certified by the institutional review board of King Mon-

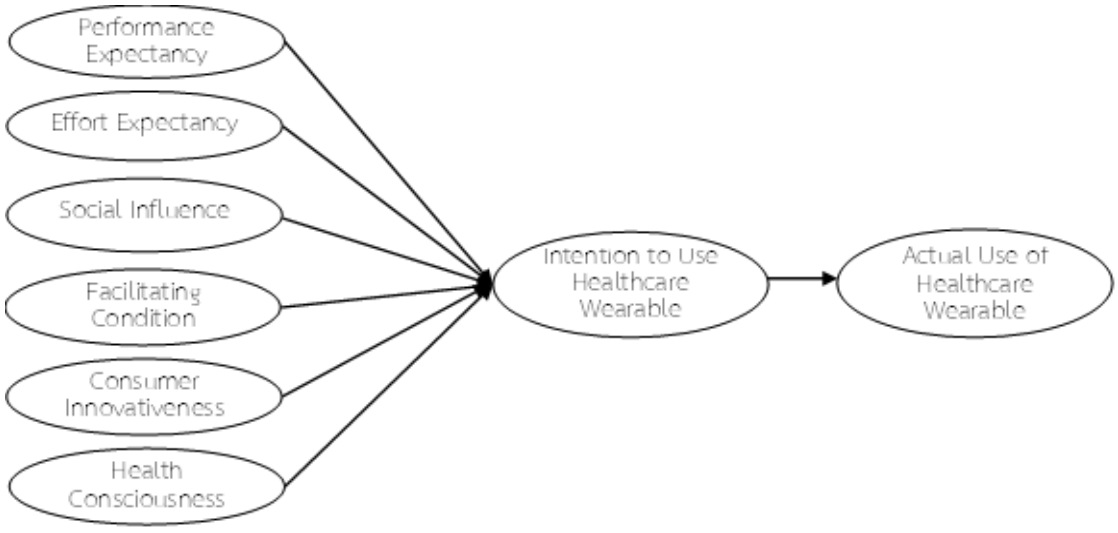

Figure 2 The Conceptual Framework of the Study

gkut's University of Technology Thonburi. A structured questionnaire was circulated to 610 respondents. Of those, 566 responses were completed and were counted for analysis. 92.8 percent of people responded. After checking the data completion of questionnaires, 566 samples were eligible for further analysis. In total, 566 participants participated (290 male and 276 female). Participants aged 30 to 55 years old comprised 68.9 percent (390) of the study sample, with a mean age of 41 years old.

Measures

All the measures employed in this study were adapted from prior research. For the UTAUT dimensions, namely, performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating condition (FC), this study was adapted from Venkatesh et al. (2003). The consumer innovativeness (CI) scale was adapted from that of Vandecasteele and Geuens (2010). This construct has been conceptualized as a second-order construct consisting of four dimensions: social (SO), functional (FU), hedonic (HE), and cognitive (COG). Each dimension had three items to reflect its construct. The Heath consciousness (HC) scale consists of three items that were adapted from Dutta-Bergman (2004). Intention to use healthcare wearable devices (INT) with four items and actual use of healthcare wearable devices (ACT) with three items were adapted from the study conducted by Venkatesh et al. (2012). The responses were gathered using a five-point Likert-type scale, with 1 indicating strong disagreement and 5 indicating strong agreement.

Data Analysis

Structural equation modeling (SEM) was used to examine the measurement and structural models. We initially tested the measurement model to verify the reliability and validity of our research instrument by adopting a confirmatory factor analysis (CFA) approach. The reliability and validity of the consumer innovativeness construct were validated using second-order factor analysis. After that, we evaluated the structural model and tested our proposed hypotheses.

Data Analysis and Results

Measurement Model

Confirmatory factor analysis (CFA) was used to assess the measurement model's reliability and validity (Hair et al., 2010). The factor loadings, the average variance extracted (AVE), the composite reliability (CR), and the Cronbach's alpha values are shown in Table 1. First, we examined the reliability of the construct using Cronbach's and CR. Cronbach's alpha and CR both exceeded 0.70, indicating high reliability (Nunnally, 1978). The results indicated that all constructs had a CR greater than 0.7 and a Cronbach's alpha value greater than 0.7, indicating good reliability. The validity analysis included both convergent validity and discriminant validity. The constructs were tested for convergent validity using AVE and outer loading. Table 1 shows that all of the constructs meet the criteria, and the AVE was greater than the 0.50 recommended threshold (Fornell & Larcker, 1981). Furthermore, the constructs' outer loading exceeded the recommended value of 0.70. As a result, the findings supported the scales' convergent validity. An AVE shown in Table 2 for each construct was higher than the squared correlation coefficient for corresponding inter-constructs, thereby providing support for discriminant validity (Hair et al., 2017). The measurement model's results indicated that the model was sufficient and adequate and that it could be used to assess the structural model.

Table1 Reliability and Validity Analysis

Construct	Items	Standardized Loading	Cronbach's Alpha	Composite Reliability	AVE
Functional Consumer Innovativeness (FCI)	4	0.86-0.90**	0.94	0.83	0.74
Social Consumer Innovativeness (SCI)	4	0.81-0.89**	0.92	0.82	0.72
Hedonic Consumer Innovativeness (HCI)	4	0.60-0.89**	0.89	0.84	0.73
Cognitive Consumer Innovativeness (CCI)	4	0.62-0.71**	0.87	0.85	0.71
Performance Expectancy (PE)	3	0.61-0.68**	0.93	0.87	0.77
Effort Expectancy (EE)	3	0.69-0.84**	0.94	0.88	0.78
Social Influence (SI)	3	0.59--0.73**	0.95	0.89	0.79
Facilitating Condition (FC)	3	0.58--0.82**	0.93	0.88	0.77
Health Consciousness (HC)	3	0.70--0.84**	0.91	0.87	0.79
Behavioral intention (INT)	4	0.56-0.88**	0.88	0.89	0.78
Actual Use (AU)	3	0.59-0.95**	0.90	0.86	0.75

Note. Significance: *p<0.05, **p<0.01

Table 2 Discriminant Validity Test

	PE	EE	SI	FC	HC	CI	BI	AU
PE	0.88							
EE	0.49	0.88						
SI	0.48	0.50	0.89					
FC	0.46	0.52	0.52	0.88				
HC	0.47	0.45	0.53	0.48	0.89			
CI	0.52	0.49	0.56	0.59	0.61	0.91		
BI	0.55	0.43	0.54	0.53	0.58	0.65	0.89	
AU	0.57	0.41	0.44	0.55	0.56	067	0.58	0.87

Note: Values in bold typeface along the diagonal indicate the square root of AVE

Furthermore, customer innovativeness was viewed as a second-order latent construct. Customer innovativeness was the second higher-order factor of hedonic, functional, cognitive, and social. The second-order confirmatory factor analysis (CFA) was used to assess the construct's reliability and validity. The overall fit statistics indicated that the model is adequately fitted (χ^2 = 70.78 ,df =58, χ^2/ df = 1.22; RMESA=0.021; AGFI=0.98; GFI=0.99; CFI=1.00). As shown in Table 3, each factor loading for a first-order construct was strongly and significantly correlated with the loadings for second-order constructs. Hypothesis 5 was supported. The results showed that customer innovativeness was comprised of four key dimensions: hedonic, functional, cognitive, and social.

Table 3 Second-Order Construct

Second-order Factor	First-order Factor	Loadings	Composite Reliability	AVE
Consumer Innovativeness (CI)	Functional Consumer Innovativeness (FCI)	0.88**	0.94	0.82
	Social Consumer Innovativeness (SCI)	0.85**		
	Hedonic Consumer Innovativeness (HCI)	0.83**		
	Cognitive Consumer Innovativeness (CCI)	0.77**		

Note. CI is the 2nd higher-order factor of FCI, SCI, HCI, and CCI

**p<0.01

Structural Model

After confirmation of the measurement model, the second stage was structural model assessment. The results revealed an adequate fit between the model data and the suggested values after the researcher processed the data in SEM and adjusted the model (χ^2 = 271.08, df =183, χ^2/ df = 1.481 ; RMESA=0.018; AGFI=0.96; GFI=0.97; CFI=0.99). As a result, the overall fit statistics indicated that the model had an adequate model fit. The hypotheses were tested by assessing the path coefficients, as well as the p-values, t-statistics. As reported in table 4, the results supported six of seven hypotheses. The assessment of path coefficients showed that performance expectancy (H1: Beta = 0.34, p < 0.05); effort expectancy (H2: Beta = 0.28, p < 0.01); social Influence (H3: Beta = 0.33, p < 0.01); facilitating condition (H4: Beta = 0.09, p > 0.05); health consciousness (H6: Beta = 0.16, p < 0.05); and consumer innovativeness (H7: Beta = 0.53, p < 0.01 found to be significant predictors of healthcare wearable device adoption. Also, behavioral intention (H8: Beta = 0.82, p < 0.01) had a positive and significant effect on the actual use of healthcare wearable devices. Therefore, H1, H2, H3, H6, H7, and H8 were supported.

Furthermore, we assessed the R^2 values to determine the research model's explanatory power. Considering the explanatory power (R^2) for adoption intention and actual usage, the adoption intention had R2 values of 0.72 and actual usage had R^2 values of 0.77. To justify the explanatory power of a model, the R^2 value should be at least 0.10 (i.e., a minimum of 10% of the variance should be explained) (Hair et al., 2017). The results suggested that the research model explained a significant amount of variation in the endogenous variables, as the R^2 values exceeded the recommended criterion benchmark. Therefore, the proposed model had strong explanatory power for predicting customer adoption of healthcare wearable devices.

Table 4 Results of Hypothesis Testing

Hypothesized	Coefficient	P-value	Decision
H1:Performance Expectancy -> Behavioral Intention	0.34	0.02**	Supported
H2:Effort Expectancy-> Behavioral Intention	0.28	0.01**	Supported
H3: Social Influence-> Behavioral Intention	0.33	0.01**	Supported
H4:Facilitating Condition-> Behavioral Intention	0.09	0.45	Not Supported
H6: Health Consciouness-> Behavioral Intention	0.16	0.03**	Supported
H7: Consumer Innovativeness -> Behavioral Intention	0.53	0.00**	Supported
H8: Behavioral Intention -> Actual Use	0.82	0.00**	Supported

Note. Significance: **p<0.01

Discussion and Conclusion

Wearable technologies play an important role at the forefront of healthcare innovation. This research proposed a model to investigate the factors that influence people's behavioral intentions to use innovative healthcare wearable devices. The findings show that the proposed model has a high level of explanatory power when it comes to predicting consumer adoption of healthcare wearable devices in developing countries. Consumer innovativeness is the most powerful factor influencing consumer behavioral intentions toward healthcare wearable devices, followed by performance expectancy, social influence, effort expectancy, and health consciousness, respectively. Furthermore, the researcher investigates consumer innovativeness, which is a second-order construct. Consumer innovativeness is based on four dimensions, according to this study: hedonic, functional, cognitive, and social.

In terms of consumer innovativeness, the research shows that consumer innovativeness has the strongest and most significant influence on consumers' adoption intention for wearable technology in healthcare. Only a few studies have examined the effect of consumer innovativeness on customer behavioral intentions to use healthcare wearable devices. This is in line with the previous findings of Lee & Lee (2018) and Cheung et al. (2019), who found a significant relationship between consumer innovativeness and healthcare wearable devices. Furthermore, this study provides new research avenues by validating the original dimensions of consumer innovativeness developed by Vandecasteele and Geuens (2010) in the context of healthcare wearable devices. The findings confirm that consumer innovativeness has four dimensions. Functional consumer innovativeness is the most valuable dimension of consumer innovativeness in healthcare wearable devices, followed by social, hedonic, and cognitive consumer innovativeness.

In terms of UTAT-related variables, the findings indicate that UTAT model constructs are supported except for the facilitating condition. According to the study's findings, performance expectancy has the greatest influence on behavioral intentions to use healthcare wearable devices. This is consistent with the findings of Gao et al. (2015), Hsiao (2017), and Reyes-Mercado (2018), which reported that performance expectancy influences healthcare wearable device adoption. This indicates that the ability of healthcare wearable devices to provide useful features and functions will, as a result, positively contribute to users' adoption of these applications. When healthcare wearable devices aid customers in completing their healthcare activities more rapidly, improving their access to their health information and improving their capability to accomplish their health goals, they are more likely to use healthcare wearable devices. Furthermore, effort expectancy has a significant effect on consumers' intention to use healthcare wearable devices. This finding is congruent with Gao et al. (2015) and Wang et al. (2014), which found that effort expectancy affects the adoption of healthcare wearable devices. The findings indicate that for healthcare wearable devices to be widely adopted in developing countries, users must perceive the technology as simple, easy to learn, and convenient for performing required tasks. Additionally, social influence played a role in consumers' intentions to use healthcare wearable devices. Social influence is a significant factor in personal health decisions and technology use. This is consistent with Gao et al. (2015), Kranthi and Ahmed (2018), and Yang et al. (2016), which revealed that social influence has an impact on the adoption of healthcare wearable devices. Customers are part of a social network when it comes to innovative wearable devices, and their perceptions of adoption and long-term usage are influenced by their social interactions. When customers' relatives and friends spread positive word of mouth about a product or service, they are taken to adopt it. Consumers' social connections could be a powerful source of motivation for them to keep using healthcare wearable devices.

Facilitating conditions is the only factor of the UTAUT model that is rejected. Results show that the effect of facilitating conditions on users' intention to use healthcare wearable devices is insignificant. This result is consistent with previous studies (Talukder et al., 2019). These findings may indicate that users are willing to use wearable technology in healthcare regardless of

organizational support, as long as the app performs well and is simple to use. Another plausible explanation is that customers receive necessary guidelines from the technology developers of healthcare wearable devices. Furthermore, this study discovered that intent to use is a good predictor of actual use of healthcare wearable devices. The relationship between behavioral intention and use behavior is consistent with the findings of the study by Li et al. (2016).

In terms of health consciousness, this study shows the congruent result of past literature where health consciousness influences the customer adoption of healthcare wearable devices (Cho et al., 2014; Chang, 2020). Consumers who are more concerned about their health are more likely to adopt a health-related wearable device. This finding also implies that if the health benefits of using a healthcare wearable device were promoted, more people interested in health would adopt it.

For theoretical implications, this research contributes to the existing literature on healthcare innovation and provides several implications for theory. First, this study provides a better understanding of how different factors may affect the intention to use healthcare wearable devices in the context of developing countries. Second, it is designed based on relevant theories and proposes a unified technology adoption model to overcome the limitations of traditional adoption theories in investigating the intention to use healthcare wearable devices. To date, no study has yet combined the UTAT and consumer innovativeness with health consciousness to explain consumers' behavioral intentions and actual use of healthcare medical technology. The findings on consumer innovativeness and health consciousness in the UTAUT will contribute to the literature on the adoption of healthcare wearable devices. This study demonstrates that the proposed model is valid and that it has enhanced the theoretical framework's predictive power. Third, the study's findings fill a gap in the existing literature by validating that consumer innovativeness in the context of healthcare wearable devices is based on four dimensions: hedonic, functional, cognitive, and social consumer innovativeness. According to the findings, functional consumer innovativeness is the most important dimension in the consumer innovation construct in the context of healthcare wearable devices.

For managerial implications, this study provides several managerial implications for marketers and developers that may be used to better promote the adoption of wearable technology in healthcare. First, the findings of this study reveal that consumer innovativeness is the strongest predictor of behavioral intentions to use healthcare wearable devices. These findings are important for marketing practitioners and managers as help them understand the motivation of consumer innovativeness behind healthcare wearable device adoption. Marketers and developers should pay attention to the four aspects of consumer innovativeness to effectively increase the healthcare wearable device adoption rate. Developers should provide well-designed innovative functions and entertainment features in healthcare wearable devices, such as user-friendly design, security approach, and sharing data with peers. Second, the results of this study suggest that performance expectancy and effort expectancy have a strong and significant influence on consumers' adoption intention for wearable devices in healthcare. Service providers should make an effort to design an easy-to-use interface to increase users' performance and effort expectancy when it comes to using healthcare wearable devices. To attract consumers, wearable devices should be simple to operate. This includes the comfort with which devices can be worn, as well as the ease with which data devices can be analyzed and interpreted. Marketers are advised to persuade consumers by communicating the benefits of using healthcare wearable devices, such as fitness tracking, exercise evaluation, health status monitoring, and the provision of sleep quality messages. Thirdly, our findings demonstrate the effect of social influence on the use of healthcare wearable devices. Marketers should leverage word-of-mouth communication such as through smartphones or other forms of media to recommend and promote the use of healthcare wearable devices. Finally, the research demonstrates the effects of health consciousness on the use of healthcare wearable devices. To attract customers, multifunctional apps

that provide practical health care advice and solutions in collaboration with health care institutions are considered essential. Developers should pay attention to what types of health functions they provide in their applications and how these functions could be customized to satisfy the needs of different patient categories.

Limitations and Future Research

Although the research findings contribute to the practice of marketing, the study is characterized by some limitations that may provide opportunities for future research. This research is restricted to a single country's customer base. Further investigation is required to determine whether there are differences in the effects of consumer characteristics across cultural boundaries. Secondly, the nature of this study is cross-sectional. Therefore, the proposed study will be unable to determine the causality and consequential effects of users' level of experience before and after the adoption of healthcare wearable devices. Longitudinal data could be used in a subsequent study to reveal the causal relationships between variables over time.

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