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Consumers' Behavioral Intention Towards Smartwatch Adoption in Malaysia: A Concept Paper

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***Abstract*—The wide-ranging features of a smartwatch have driven the rapid growth of the smartwatch market as they pique the users' interests by offering interactive technology that simultaneously promotes fitness and tracks health. Nevertheless, the factors influencing smartwatch adoption among individuals are yet to be comprehended despite the ever-growing popularity of smartwatch usage. Hence, to understand the possible factors in detail, a research model is proposed to indicate the influential underlying factors relative to smartwatch adoption in the Malaysian populace. This study will examine the four proposed dimensions of perceived benefits, healthology, IT innovation, and smartwatch as luxury products. Online questionnaires will be used to collect the research data, while SPSS will be used to run both preliminary research and descriptive analyses, PLS-SEM will be used to further analyze the model.**

***Keywords*—Behavioral intention, healthology, IT innovation, luxury product, perceived benefit, smartwatch adoption**

I. INTRODUCTION

Smartwatch refers to a computationally driven wrist-worn device. Other than featuring an integrated clock, it is also capable of connecting to other devices through a wireless short-range connectivity, providing alert notifications, as well as gathering personal data through various sensors and data storage [1]. Into 2020, smartwatch is anticipated to surpass other wearable technology in speed [2]. In fact, the intention of smartwatch adoption has increased worldwide. Presently, smartwatch is popular among consumers due to its appealing multifunctionality to a variety of user interests, such as promoting fitness, monitoring health, tracking locations, and especially extending communication with 'smart' features [3]. The smartwatch application is notable in various sectors, such as healthcare, education, commerce, entertainment, and sports [4].

Smartwatch has been shifting the way people communicate. Likewise, the general public has also been steadily pursuing a healthier lifestyle. In spite of the Covid-19 pandemic, the demand for a smartwatch is expected to grow significantly between the year 2020 to 2029 [5]. In Asia Pacific, the marketplace is dominated by Japan, owing to the nation's strong awareness of smartwatches and pedometers, while India and China have been forecast to achieve their main revenue due to the rising trend of cheap devices and smart wearables in these nations. Meanwhile, in Malaysia, the revenue for smart wearables in the year 2018 had achieved a total of USD 24 million, and it has been forecast to reach up to USD 29 million in the year 2022 at a 5.7 percent annual growth rate [5]. According to [6], the use of smartwatch among Malaysians is expected to increase from 0.8 million in the year 2016 to 1.6 million in the year 2022, with most of its purposes for well-being and health, such as smoking and overweight mitigation.

However, the smartwatch market has been reporting a continuous decline. Although at a rapid pace, users are yet to adopt such wearable technology. Besides, as indicated by eMarketer, the growth of the smartwatch market has been declining over years. In October 2015, eMarketer predicted more than 60 percent of growth for the use of these devices; however, in 2016, the estimates recorded only a 24.7 percent growth. Despite its minimal growth, a large subset of smartwatch wearers remains. Notwithstanding, the factors influencing smartwatch adoption are yet to be fully discovered, and only a small number of studies have focused on user acceptance and user behaviour concerning the adoption of a smartwatch. Hence, these statistics confirm the beneficial

research area of Malaysian consumers' behavioral intention toward using a smartwatch, which warrants further investigation.

In academia, studies on smartwatch have mostly been focusing on its application purposes, such as healthcare, fitness, and biometrics [7], whilst employing factors from prior theories, such as Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT2), to explicate their adoption [8], [9], [10]. However, none has explicated the behavioral changes further into the use of smartwatch technology, and studies on smartwatches have been more technology-oriented than audience-oriented. With limited research examining the use of smartwatch by consumers whose concern is about maintaining their health, this calls for a study on the antecedent factors that influence the behavioral intention towards the smartwatch to bridge the aforementioned gap.

This study aims to understand the behavioral intention of consumers towards the adoption of a smartwatch from the viewpoint of Malaysian community. Based on an extensive literature review, this study proposes a research model that consists of the following dimensions: hedonic, healthology, utilitarian, perceived innovativeness, perceived compatibility, perceived self-expressiveness, and the need for uniqueness. As such, this study aims to fill the research gap through an investigation of how these dimensions relatively influence the behavioral intention of consumers towards the adoption of smartwatch technology.

This paper is organized in the following ways; firstly, a literature review will be conducted on the perceived benefits, healthology, IT innovation, and luxury products relative to smartwatch. Next, this paper will propose a conceptual model in view of the conceptual foundation from the literature review, which incorporates the fundamental dimensions of user perceptions relative to the behavioral intention towards the smartwatch. Subsequently, the research methodology employed in this study will be explained; finally, this paper will discuss the theoretical and practical contributions of the conceptual model proposed in this study.

II. FACTORS THAT INFLUENCE THE ADOPTION OF SMARTWATCH

As explained in previous sections, present studies are limited in describing the adoption of smartwatches. The current study seeks to establish a research model by drawing on the established literature from the perspective of customer behaviour and innovation adoption. This interdisciplinary approach provides insights from different disciplines of study that are complementary in studies of IT adoption.

This study postulates a rise in adoption rate as customers consider the advantages of smartwatch (utilitarian and hedonic). This model also indicates that consumers may prefer to adapt to the technology due to smartwatch's roles as a fashion accessory or user enjoying the new technology-specific features provided in smartwatch applications.

In that, according to the surveyed past literature, the present study proposes that the smartwatch adoption intention is affected by perceived benefits, healthology, the role of smartwatch as an IT innovation and smartwatch as a luxury product as the predominant factors affecting the smartwatch adoption. Fig. 1 highlights the main constructs of the proposed model.

A. Perceived Benefit

Smartwatch use is increasingly becoming a lifestyle due to a wide variety of possible benefits for day-to-day activities. Smartwatches deliver the most benefits when connected to the Internet, either through Wi-Fi, mobile internet, or Bluetooth. This smart device is capable of collecting data and presenting relevant information, such as allowing users to not only monitor and respond to text messages, social media, and email notifications, but also to utilize the health and fitness tracking applications, such as heart rate, step taken, and even the number of hours of sleep [11]. Interestingly, many smartwatches come with entertainment features as well today, such as listening to music. In general, smartwatches provide users with multiple hedonic (enjoyment) and utilitarian (perceived usefulness) benefits. Many studies have shown that hedonic and utilitarian values have driven the use of smartwatches. It was found that both hedonic and utilitarian benefits substantially influenced the intention to continue use smartwatch [11].

1) Hedonic Values

Hedonic value refers to joy or enjoyment obtained through the use of technology and has been conceptualized as "perceived enjoyment" [12]. For example, users are motivated to use the experiential-related application (also known as app) of smartwatch, such as streaming music or gaming, due to the hedonic benefits of the app itself and not by the rewards. A study conducted by [10] reported that enhanced hedonic features of the smartwatch have contributed to more favorable user attitude towards smartwatch usage. A recent study by [15] found that hedonic value has the largest impact on the user's attitude towards intention to use smartwatch. However, it is argued that hedonic value more influential in affecting perceived value towards intention to continue use of smartwatch [14]. Thus, based on the above discussion, the following hypothesis is proposed:

H1. Hedonic benefits is positively associated with the intention to use a smartwatch.

2) Utilitarian Values

On the other hand, utilitarian values derived from the functional values; by means of user evaluations. The utilitarian values influence the perceived usefulness of users. Utilitarian benefits are expected to give the smartwatch users with such a functional value that may result in an increase in user efficiency, such as becoming more organized and more productive [13]. A study found that perceived usefulness and visibility are essential factors influencing the intention to adopt [13]. Moreover, [14] discovered that the functionality and compatability positively significant influenced perceived usefulness of smartwatch users and followed by ease of use,

expected usefulness, symbolic values and expected visibility. It is argued that perceived usefulness had a slightly strong effect on perceived value of the intention to use smartwatch [14]. Thus, based on the above discussion, the following hypothesis is proposed:

H2. Utilitarian benefits is positively associated with the intention to use a smartwatch.

B. Healthology

Healthology refers to an interface between health issues, information science, and technology, which seeks to deliver new ways of addressing special needs for healthcare [16]. According to [17], compared with the non-health conscious consumers, those with a wellness-driven lifestyle who favor regular exercises and healthy foods tend to participate more in preventive health behaviors. In light of this matter, the smartwatch as wearable technology has gained popularity owing to its continuous health monitoring feature, including fitness tracking elements and health-recording parameters. The emergence of such technologies has, therefore, enabled consumers to personalize their healthcare relative to their circumstances. For instance, during the day, consumers can track their physical activity by counting steps and this can be of use in some degenerative or rehabilitation illnesses [18]. The applications of smartwatch by most consumers include tracking their heart rate activity in terms of whether or not it is in a healthy and non-risky range, as well as checking their sleeping patterns to ensure that they get proper rest [18]. On the contrary, [16] reported that healthology does not significantly influence the intention of using smartwatches; however, in a study by [19], it was found that healthology results in a pleasing attitude towards smartwatch.

Based on a study by [20], the adult group has been reported to adopt a more positive attitude toward e-Health technology, as opposed to the younger group. However, according to [21], older adults are more unlikely to adopt e-Health technology. While this device is deemed useful for recording the health information of the elderly, it is no doubt that the smartwatch technology will be of assistance to health disease management [22].

By incorporating the information related to health with technology as well as presenting quantitative data on health behavior, the smartwatch is perceived to assist consumers with a healthier lifestyle that, in turn, reduces healthcare costs [23]. As such, this will provide a foundation for the users' positive appraisal of the device. Hence, it would be interesting to investigate how healthology influences consumers' behavior towards smartwatch adoption. Correspondingly, this study proposes the following hypotheses:

H3. Healthology is positively associated with the intention to use a smartwatch.

C. Smartwatch As an IT Innovation

Smartwatch technological advances have allowed the technologies to fulfill a function that goes beyond telling the time. The smartwatch, like smartphones, can help to organize and monitor virtually every aspect of our lives. The versatility of smartwatch technology expands beyond traditional basic watches to provide additional customization and comfort. However, only a few studies have explored the causes or antecedents of a smartwatch as part of IT innovation.

1) Perceived Compatibility

Perceived compatibility is described as how the device or service blends with one's everyday behavioral habits, lifestyle, or experience. The smartwatch provides a persistent track of individuals' daily activities and routines. Different studies have shown that compatibility is a key element in determining the acceptance of technology by individuals [24, 25, 26, 27]. It is argued that perceived compatibility may affect consumers' intention or behavior of smartwatch adoption in particular. In view of the growth rate of smartwatch adoption by individuals in Malaysia, perceived technology compatibility is an influential variable. Consequently, this work proposes the evaluation of impact of perceived compatibility on the behavioral intent of smartwatch use, thus formulating the hypothesis in this study:

H4. Perceived compatibility is positively associated with the intention to use a smartwatch.

2) Personal Innovativeness in Information Technology (PIIT)

[28] had proposed and described Personal Innovativeness in Information Technology (PIIT) as the willingness to try out new information technology. Individuals with high personal innovativeness are often referred to as early adopters who are relatively fast, more open to new knowledge and experiences, and more likely to take chances in exploring technologies. As the smartwatch is an emerging technology, personal innovativeness is expected to have a significant effect on the acceptance of smartwatches. Smartwatches can be particularly useful to highly innovative users, although the technology is not deemed to be beneficial by low innovative users, and would not change their intent on using the technology. Many previous studies have shown that there is a strong, positive association between personal creativity and behavioral purpose [29, 30, 31, 32]. Therefore, hypotheses were made based on the following explanations:

H5. Perceived innovativeness in information technology is positively associated with the intention to use a smartwatch.

D. Smartwatch As Luxury Product

Today the world is seeing tremendous growth of the smartwatch market, which is inline with the advancement of technology which are very much welcome by the new generation. Through innovation in technology, it is also reported that smartwatch and other technological devices which include handphones and laptops plays a significant role

in the lives of individuals today [33]. However, this raised question whether or not smartwatch is a necessity or a desire of owning a luxury goods? Past empirical research has found that smartwatch is considered a fashion accessory [13], as well as an indication for being a luxury fashion [8], which symbolize the user social status, wealth [34], and exclusivity [35, 36].

In the past, the notion of luxury bring different meaning where it refers to goods or services that are scarce and not made available to all but only to those who are more privileged than others to purchase the luxury goods. In other words as described by recent researchers, luxury traditionally features consumers who portrait his or her wealth via purchasing behavior [35, 38, 39). However, there is a changing pattern to the meaning of luxury in today's world as consumer's expectation, needs, and preference changes. Empirical research has reported that luxury portrait a person's worthiness, social belonging and status [40, 41] which allow individual to express his or her wealth. This fulfills self-interests of owning a luxury goods and the ability to display the use of luxury brands. This happens because the assumption that the luxury goods satisfy the psychological benefit of perceived self-expressiveness.

1) Perceived Self-Expressiveness

Perceived self-expressiveness is one of the most discussed construct when discussing luxury products [42, 43] as it has the power to communicate valuable information and can be used by consumers to reflect aspects of "self" and to express their identity as well as lifestyle [43]. A luxury product often lead the general public to make inferences about the owner, and in the context of this research, the smartwatch own would signals status of the user. As an example, the main reason a person buys a Fitfit smartwatch is not to prevent from being late, but to show to others that he can afford such a watch. This is inline with empirical research by [44], selection of specific smartwatch brands can address specific attributes in terms of external appearance such as belongingness and social status of a particular society. Thus, a luxury brands reinforce a person's lifestyle and identity by adding perception that other people can relate to. This would result in creating a self-image within their social circle and seen as similar and part of trendy group, which is a way of self-expressiveness [45]. However, some consumers of luxury goods are driven by exclusivity and rareness, where this type of individual strives to create a unique identity that is based on personal choices rather than the need to conform to social expectation.

H6. Perceived self-expressiveness is positively associated with the intention to use a smartwatch.

2) Need for Uniqueness

In addition to serving self expressiveness, luxury products could enhance and confirm a consumer's need for uniqueness. The need for uniqueness implies that some individuals who own luxury products want to differentiate themselves from others and to be seen as one of a kind. A consumer who purchase dissimilar luxury products and frequently adopt new luxury product such as smartwatch is trying to fulfill their need for uniqueness without being perceived as abnormal in their social context [46]. A luxury product is considered unique when it carries and expansive price tag in comparison to normal standards, the more valuable the luxury product becomes. In addition, uniqueness of luxury product look at the functional value that it carries along and it strengthens the individual's need for uniqueness and the wish of the consumers for exclusivity.

Thus, in line with the first construct of luxury products mentioned earlier, which was perceived self expressiveness which look into the desire to be similar within social groups, individuals would still want to enjoy some level for uniqueness [47] with the luxury goods that they own. Whether or not owning a smartwatch is considered as luxury, depend upon the interpretation of whether the smartphone owner's perceive them as luxurious items or not. Thus, self-expressiveness and the need for uniqueness in terms of defining the luxuries of a product may be important elements in the purchase of smart watch. Correspondingly, this study proposes the following hypotheses:

H7. Need for uniqueness is positively associated with the intention to use a smartwatch.

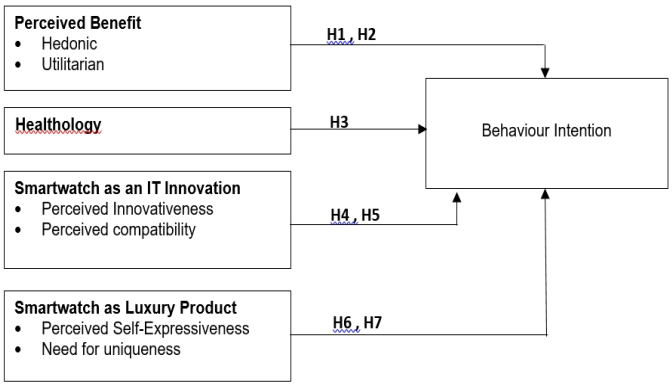

Fig. 1. The proposed conceptual model

III. METHODOLOGY

This study will focus on users' perceptions of smartwatch behavioral intention from the Malaysian user perspective. This research follows a step by step process in order to produce the findings output (Fig. 2).

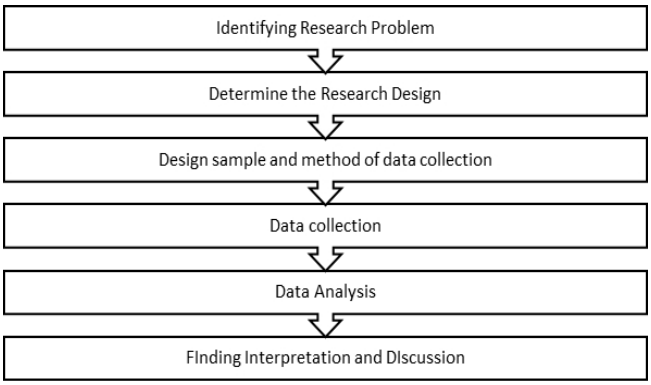

Fig. 2. Research Process

The first process involved formulating the research problem and the research design. A quantitative research approach will be deployed with the aim to identify the factors that influence the adoption of smartwatch among young adults in Malaysia. Four dimensions will be tested: perceived benefits, healthology, IT innovation, and smartwatch as luxury products.

The second process is designing the sample and method of data collection. Provided that this research focuses on embracing smartwatch, those who do not own a smartwatch are entitled to participate in the survey. This selection criterion is considered important, as those who already own a smartwatch will have a different perspective towards smartwatch usage, thus creating a possibility of influencing the final findings. A filter question will be added in the online survey to ensure the criteria of the respondents are met in the survey. Simultaneously, to maintain the study's robustness, the research purpose and definitions will be explained prior to presenting the online questionnaire for answering.

TABLE 1. Constructs dimension

Section	Items	Operational Definition	Sources	Total items
Section A:	Demographic			8
Section B:				
Perceived Benefits	Utilitarian	Expected benefits to smartwatch users to increase user efficiency [13].	[48]	3
	Hedonic	Joy or enjoyment obtained through the use of technology and has been conceptualized as "perceived enjoyment" [12].		4
Healthology		An interface between health issues, information science, and technology, which seeks to deliver new ways of addressing special needs for healthcare [16].	[16]	3
Smartwatch as an IT innovation	Perceived Compatibility	The extent to which the innovation is perceived to be consistent with the adopters' beliefs, lifestyle, existing values, experience, and current needs, and high compatibility can result in preferable innovation adoption	[49]	3
	PIIT	Willingness to try out new information technology [28].	[15]	5
Smartwatch as luxury product	Perceived Self-Expressiveness	The extent to which a product or technology reflects one's personal characteristics [46]	[15]	6
	Need for uniqueness	The trait of pursuing differentness relative to others through the acquisition, utilization, and disposition of consumer goods for the purpose of developing and enhancing one's self-image and social-image [47]	[50]	5
Section C:	Marker Variable	-	[51]	3
Section D:	Behaviour Intention	Perceived likelihood of an individual to engage himself or herself in a particular behavior [52]	[53] [54]	5

Six constructs will be measured in this study: hedonic values, utilitarian values, healthology, perceived compatibility, PIIT, perceived self-expressiveness and need for uniqueness. All constructs will be assessed on a 5-point Likert scale from "Strongly Disagree" to "Strongly Agree". All questions measuring the constructs will be adapted from the relevant literature.

For the data collection process, all data will be gathered from the online questionnaires, whereby students will be provided with a link to the online survey. All participants will require approximately 10–15 minutes to answer the questionnaire. The GPower program [55] was used to measure the appropriate sample size with a predictive power of 0.95. The estimates indicate that the sample size needed was 153 (effect size of 0.15) with a maximum of 7 predictors [56]. The completion period for data collection is planned to be within two months.

This research opted for two primary ways to monitor method bias by developing analysis procedures and statistical controls [57]. Besides protecting the confidentiality of the responders, this study employed Harman's Single Factor technique, Marker Variables, and Full Collinearity as the statistical remedies to test the presence of common method bias.

To conclude, the Partial Least Squares (PLS) Structural Modeling will be used to test the study model to explore the relationship between the variables [58]. Based on the prediction-oriented nature of this research, the PLS method was chosen to decide how chosen exogenous variables can be used to predict endogenous variables. A two-stage method will be used to test the new model; firstly, to evaluate the validity and reliability of the measuring model. Secondly, a structural model (relation among variables) will be tested to finalize the result.

IV. CONCLUSION

This study has indicated that, in spite of the rapid development of the smartwatch market, little is known about what drives individual adoption of the smartwatch. In addition, it is learned that the articles were mainly empirical, with the main focus on the utilization and motivation behind this device. Hence, this study attempts to develop a research model to reduce the gap by concentrating on the factors of consumers' behavioral intention, such as hedonic, healthology, utilitarian, perceived innovativeness, perceived compatibility, perceived self-expressiveness, and the need for uniqueness of the device towards adopting a smartwatch. Future work will proceed to the validation of the research model through non-experimental work using students at one of the local universities in Malaysia as participants. The outcome of this research can offer a better understanding towards the behavioral intention of users in embracing a smartwatch.

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