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Factors influencing adoption of wearable devices in Dubai

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Abstract

Aim/purpose – Increasing importance of quantified self along with the number of available wearable devices create base for excitement among those perceiving technology as a catalyst for change. Despite multiple theories, in vain is to search for a model that would be suitable to visualise the adoption of wearables. The objective of this study is to recognise factors influencing the adoption of smart wearable devices and measure the strength of relationships between identified variables and dependent factor.

Design/methodology/approach – A proposed research model was developed and tested, based on an analysis of 108 survey insights from existing and potential users of smart wearable devices. With Dubai claiming itself ‘the smartest city worldwide’, research was purposely focused on this city, with insights collected during 37th GITEX (Gulf Information Technology Exhibition) Technology Week (8-12 October 2017), in Dubai. Statistical analysis, with the use of Adanco 2.0.1 software, was conducted and as a result, structural equation modelling was proposed.

Findings – The study shows clearly the growing importance of the wearables trend and consumers’ willingness to possess the same. Based on the conducted literature analysis, factors playing critical role, like Product Attributes (PA), Perceived Ease of Use (PE) and Perceived Usefulness (PU), were identified along with the gaps pertaining to the adoption of smart wearable devices in Dubai.

Research implications/limitations – The outputs of the conducted research provide practical guidance for solution/technology/product makers as well as sales representatives, to mould and pitch the product in a more effective manner. Due to time and financial constraints, study lacks conducted in-depth expert reviews, focus groups and laboratory experiment for real-time experience with existing/planned products. The limited sample size (108 respondents) and lack of possibility to generalise on the population, due to sampling by convenience are other points of improvements for future research.

Originality/value/contribution – The study bridges the literature gap, providing quantitative analysis and overview of factors impacting on the adoption of wearable devices, based on the Theory of Reasoned Action, the Theory of Planned Behaviour and the Technology Acceptance Model. Moreover, constructed on achieved results, it proposes a new sequential multi-method approach model of technology adoption, based on researched factors such as Perceived Usefulness and Attitude towards smart wearable devices, influenced by Perceived Ease of Use and Perception towards new technology. Findings of the study allow for direct business implementation by smart devices developers, willing to introduce their new solutions to the market and plan their promotional strategy.

Keywords: wearables, wearable devices, Internet of Things (IoT), Dubai, adoption model.

JEL Classification: O14, O33, L86.

1. Introduction

Wearable technology is far more than just a smartwatch or glasses. It includes different accessories, for instance, smart jewellery in the form of rings or pendants, clothing etc. which can be comfortably worn around the body. Wearable Technology (WT), wearable devices or shortly called wearables, is a common name for intelligent devices, which are literally worn (Çiçek, 2015; Tarabasz, 2016b). They constitute a touchpoint between four technological trends, combining and merging mobile, Internet of Things (IoT), Augmented Reality (AR) and Big Data.

These intelligent accessories communicate via the Internet on the M2M (Machine to Machine) or O2H (Object to Human) basis, complementing and developing functions fulfilled by smartphones. Thus, they are becoming the next step towards worldwide digital and mobile revolution. Their capacities are astounding: from quantifying the amount of burned calories, hours slept, paths indexing, distance travelled, through measuring blood pressure, and glucose level, taking pictures, receiving phone calls up to becoming a personal trainer and coach. These inconspicuous devices analyse our lifestyle, visually becoming tiny add-ons: watch, glasses, wristband, shoes or intelligent T-shirt (Tarabasz, 2016a).

With its enormous possibilities, wearable technology is predicted to have a high growth rate in future and is perceived to become a game-changing factor for the society and nature of the business. The number of digital devices is exploding, to reach 3 billion in terms of unit sales in 2018, in comparison to half of it in 2013 (Statista, 2018b). Mobile connectivity of such devices reached 593 million in 2018 (Statista 2018a), therefore by its mass, wearable technology is perceived as the catalyst for change by multiple authors (Funk, 2015; McGregor, 2017; Neuhofer, Buhalis, & Ladkin, 2015; Satyanarayanan, 2002).

Due to the accelerating speed of innovation (Gartner, 2017), the technology-driven consumer behaviour is changing – towards ubiquity, ease of use and incorporation in everyday life. According to Kurwa, Mohammed, & Liu (2008), wearable technologies must be integrated, seamless, transparent, comfortable, portable, multi-functional, useful, reliable and practical, therefore among many available definitions, the ones presented by Ching & Singh (2016) or Çiçek (2015) are closest to authors' perspective. They define wearable technology/devices as electronics incorporated into clothing, or simply accessories which can be comfortably worn or attached to the body.

Figure 1. Chronology of wearable devices



Source: Tarabas (2018) – translation A.T.

Wearables are, however, considered to be more sophisticated than any other hand-held technology, e.g. mobile phones, tablets or laptops due to their sensory and scanning features (Çiçek, 2015). These devices have communication capabi-

lity and will allow users to have access to information in real time. Examples of wearable devices include watches, glasses, smart jewellery, for instance, rings, bracelets, smart clothing, smart shoes and some hearing aid-like devices.

It is worth emphasising that wearable technology existed far before the technological wave of being networked (so-called electrification of the 21st century), this simplified chronology is presented in Figure 1. Moreover, regardless of the moment of its introduction, as it becomes clearly visible that the main aim of inventing was the same the facilitation of the life of consumers and increase in the measurability of surrounding reality.

According to Forbes (Lamkin, 2016), the estimated market value of wearables for 2020 is \$34 billion. Respectively, according to Market & Market (2016), it is \$51.6 billion for 2022, regardless of the fact that this amount does not go in alliance with predictions for 2021 and according to Investopedia (Delventhal, 2016) estimating the same for \$71 billion. According to IDC (International Data Conference), MEA market is to grow by (20.9) % in 2017 in consumer buying smart devices, which will be dominated more by smartwatches and wrist bands. But Gartner (2017) predicts that the growth of wearables will significantly increase by embedding them into smart clothes and jewellery. Juxtaposition, based on its insights, is presented in Table 1 which showcases this increase.

Table 1. Worldwide forecast for wearable (in millions of units)

Device	2016	2017	2018	2021
Smartwatch	34.80	41.50	48.20	80.96
Head-mounted display	16.09	22.01	28.28	67.16
Body-worn camera	0.17	1.05	1.59	5.62
Bluetooth headset	128.50	150.00	168.00	206.00
Wristband	34.97	44.10	48.84	63.86
Sports watch	21.23	21.43	21.65	22.31
Other fitness monitor	55.43	55.70	56.23	58.73
Total	265.88	310.37	347.53	504.65

Source: Gartner (2017).

Moreover, the increasing popularity of intelligent devices and their decreasing prices along with urge of qualified self (burned calories, distance, pulse rate etc.) make more and more companies joining this market, increasing the existing rivalry rate (Gimpel, Nissen, & Gorlitz, 2013). Some of the companies decide on a narrow specialisation, becoming an unquestionable market leader (i.e. Oculus), others offer compatible solutions with intelligent objects (like Apple). The last category aims to maximise the number of available applications

(Medtronic). At this moment, it is worth referring to IDTechEX (Hayward, Chansin, & Zervos, 2017) report and quote cumulated juxtaposition of wearables as per sector, product type and location, presented in Table 2. It has been done for 39 categories of available solutions, covering products of such brands as Google, Apple, Samsung, LG, Huawei, Microsoft, fitbit, Jawbone, Medtronic, Nike, Under Armour, Adidas, Flex, Jabil, Foxconn, AiQ, Bioling, Decathlon, Verily, imec, KOPIN, Sarvint, Varib, StrwetchSense, Anotech, EPSON, gsk, Koru, PrimoID, Vivaln, Catapult, HerxoSkin, Proteus, UICO, Cityzen, Firstbeat, Hivox, RICOH, Sensum, Sharp, Clothing+, Johnson&Johnson, SHARP, Valencell, Csem, Humavox, Oculus etc.

Table 2. A cumulated juxtaposition of wearable technology

sector	product type	location
<ul style="list-style-type: none"> • healthcare • fitness & wellness • infotainment • commercial • industrial • military • multisector • other 	<ul style="list-style-type: none"> • smartwatch • fitness tracker • smart eyewear • smart clothes • medical devices • infotainment 	<ul style="list-style-type: none"> • head • ear • eye • corpus • shoulders • wrists • ankles & feet • implant • multiple locations

Source: Adapted from: Hayward, Chansin, & Zervos (2017).

According to Ericsson Consumer Lab (2016), the existing wearable device users believed that technology would be more advanced and 60% of the people believed that smart garments would be developed by 2020. There are a lot of fantabulous testing going on in healthcare, i.e. fitness track, where the manufacturers are trying to create the next big and different thing after the mobile phones, laptops or tablets, therefore having a systemic approach to the adoption of wearable technology could have a true business impact.

For this reason, hypotheses, based on a created model, are proposed to show the relationship between factors affecting smart wearable devices and adoption towards the technology, with the use of primary data collected during 37th. Gitex technology week in Dubai, which demonstrates next-generation technology solutions from international companies to entrepreneurs and tech enthusiast.

The paper is organised into four subsequent parts. The first part introduces the topic of wearable devices and quantifies the concept on a worldwide scale. It provides examples of such solutions and defines brands of multiple companies using the same. The following part contributes to the idea with profound literature review, describing a theoretical framework, and is based on available models:

the Theory of Reasoned Action, the Theory of Planned Behaviour and the Technology Acceptance Model. It derives own proposal of a sequential multi-method approach model. The third part contributes towards statistical analysis of obtained results, testing hypotheses and clarifying the linear regression model. The conclusion elaborates on managerial implications and future scope of further research.

2. Literature review

2.1. In search for actors influencing the adoption of wearable technology

To identify the factors influencing the adoption of wearable technology, one should need to understand the theoretical models, contributing to the adoption process. Rogers (2003) in 1962 described the diffusion of innovations as a theory, in which he explained the stages and pace of the process of spreading new ideas. His well-known, bell-shaped curve of diffusion of innovations, formulated four adopters' groups: innovators (2.5%), early adopters (13.5%), early majority (34%), late majority (34%) and laggards (16%). Clearly indicating stages and the chasm to be closed (Rogers, 1962), unfortunately he was not explaining factors facilitating decision taking while adopting the idea, especially technology-related.

Subsequently, Kozinets (2007) along with technology at raise, was trying to align different concepts (i.e. corporate futurism, computer revolution, science fiction, techno-war) to one nodal point, in which he concluded technology as progress, impacting the consumer. In this framework he proposed an inter-related semiotic square for the ideological field of technology. Based on four different approaches, he indicates Technopian, Green Luddite, Work Machine and Techpressive attitudes, perceived from the point of view of different consumer narratives. Unfortunately, regardless of the fact of research potential and useful typology, it would be in vain to search there for factors influencing technology adoption.

In order to achieve the aim of the research, a profound literature study has been conducted, looking for the best model to justify the technology acceptance and defining factors impacting the adoption of wearables devices. The use of wearable technology depends on the industry vertical and differs from one sector to another, therefore different fields, e.g. health, education, fitness are being impacted. The main goal of wearable technologies is to incorporate portable and

functional electronics into an individual's daily life. Prior to their presence on the market for personal use, wearable devices had the biggest implications for health care and medicine, followed by implementation of the Internet of Things in manufacturing and transportation (Business Wire, 2018). Multiple studies have proven that there are various factors which affect the adoption of wearables. According to Chuah, Rauschnabel, Krey, Nguyen, Ramayah, & Lade (2016), if people perceived the wearable technology to be useful, then they would be more likely to buy the device. Moreover, he rightly claims that word of mouth can also influence the adoption behaviour of people. Phua, Wong, & Abu (2012) examined factors impacting the behavioural intention to use the Internet as a teaching tool in education. Mahmood, Burn, Gemoets, & Jacquez (2000) claimed that perceived benefits, such as user's expectations, perceived usefulness, and ease of use can affect IT end-user's satisfaction. According to Fang & Chang (2016), perception is an important factor here as well, as it determines how smart devices are perceived by the user. Soh, Wongand, & Chan (2010) studied perceived risk and perceived usefulness influencing user's intention to use biometric technology in online applications. Adapa, Nah, Hall, Siau, & Smith (2017) indicated factors, e.g. brand image and personal values as also playing an important role in determining the adoption of wearable devices. Gao & Bai (2014) studied that the perceived ease of use and perceived behavioural control impact the user's acceptance in the context of IoT technology. They emphasised that wearable devices provide immense offers to the companies, which want to create a strong connection with the customers.

According to Chuah et al. (2016), perceived usefulness and visibility is an important factor impacting the adoption towards smart wearable devices. Systematic evaluations of the effectiveness and efficiency of wearable health care systems are considered crucial to ensure potential user acceptance (Chan, Campo, Estève, & Fourniols, 2009). Mahmood et al. (2000) studied the way in which consumers' behaviour is affected by how they perceive and what they expect from technology. Social influence, such as the brand image or WOM, also impacts user adoption towards wearable technology (Chen & Shih, 2014). Perceived ease of use does not influence the attitude of people (Hwang, 2014).

Previously analysed body of research indicates clearly that there are two most important factors, i.e. Perceived Usefulness (PU) and Perceived Ease of Use (PE), which affect the adoption of the new (wearable) technology, though no other factors are commonly mentioned by different authors. Thus, to fill in the gap in the literature and to find answers, this study investigates elements like

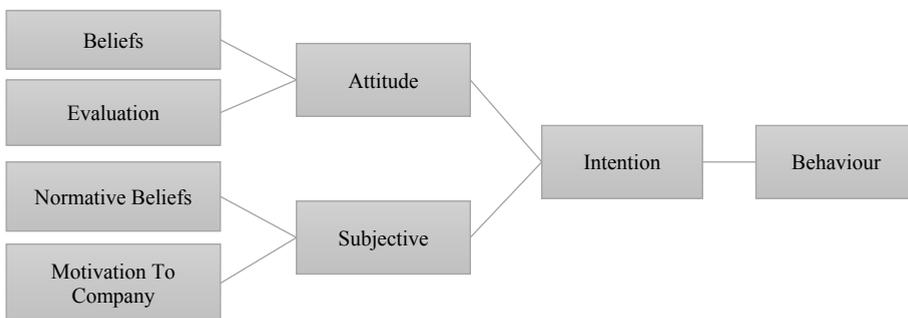
device attributes, such as price, features, safety and other behavioural beliefs that explain consumer adoption towards new technology, and as well will look to either accept available model or, build on existing ones, which will be proposed in own derived framework.

2.2. The Theory of Reasoned Action

Consumer behaviour states the focal point of every marketer. The information on buyer conduct helps the advertiser to see how the purchaser thinks, feels and selects from options like alternative products, brands etc. and how the prospect is impacted by their social or economic conditions, the reference groups, family, salespeople etc.

The Theory of Reasoned Action (TRA), developed in 1975 by Ajzen & Fishbein (1980), examines the relationship between attitudes and behaviour. The main predictor of behaviour according to TRA is the behavioural intention, rather than attitudes. According to this theory, attitudes towards behaviour (or more precisely, attitudes towards the expected outcome or result of a behaviour) and subjective norms (the influence other people have on person's attitudes and behaviour) are the major predictors of behavioural intention, what is visualised in Figure 2. TRA works most successfully when applied to behaviours that are under a person's volitional control (Ajzen & Fishbein, 1980).

Figure 2. Chronology of wearable devices



Source: Ajzen & Fishbein (1980).

Due to the fact that the Theory of Reasoned Action is not taking into account the perceived behavioural control attribute, which would be a parameter related to the perceived value of a brand by a customer, hence, the proposed research model cannot be straightforwardly incorporated to TRA. The Theory of Reasoned Action

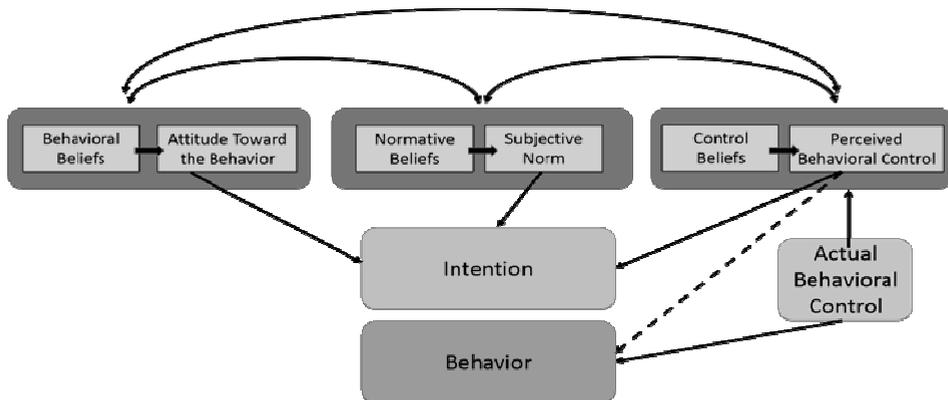
does not consider the behaviour variable of the consumer. Other inter relation variables like perceived behaviour are not also defined by this model. Therefore, further focus on the Theory of Planned Behaviour was considered.

Not neglecting the importance of the described model, own proposal will rather be based on the Theory of Planned Behaviour, which is discussed in the next section.

2.3. The Theory of Planned Behaviour

In 1980, the Theory of Planned Behaviour (TPB), derived from the Theory of Reasoned Action, predicted an individual's intention to engage in behaviour at a specific time and place. The key segment of this model is behavioural intent. The attitude about the likelihood that the behaviour will have the expected outcome and the subjective evaluation of the risks and benefits of that outcome, influences the behavioural intentions (Ajzen, 1985). The theory tends to explain all behaviours over which people have the ability to exert self-control. The TPB, visualised in Figure 3 is comprised of six constructs that collectively represent a person's actual control over the behaviour (Ajzen & Fishbein, 1980).

Figure 3. The Theory of Planned Behaviour model



Source: Ajzen (1985).

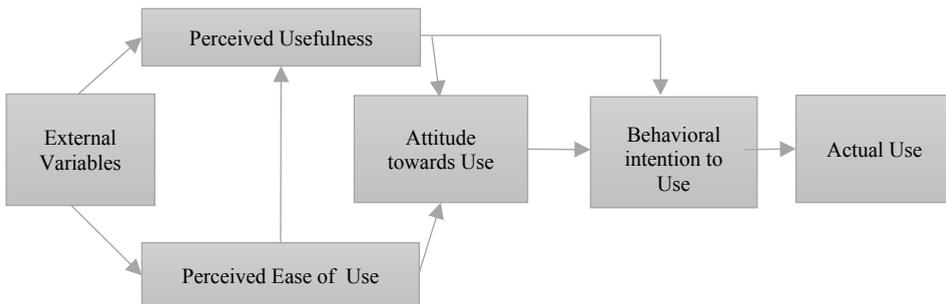
According to the TPB model, attitudes refer to the degree to which a person has a favourable or unfavourable evaluation of the behaviour of interest. It considers the outcomes of performing behaviour. The behavioural intention refers to the motivational factors influencing given behaviour, where the stronger the intention to perform the behaviour, the more likely behaviour will be performed. Subjective norms – these refer to the belief about whether most people approve

or disapprove of the behaviour. They relate to person's beliefs about whether peers and people think he or she should engage in the behaviour or not. Social norms – these refer to the customary codes of behaviour in a group of people or a larger cultural context. Social norms are considered normative, or standard, in a group of people. Perceived power relates to the perceived presence of factors, that may facilitate or impede the performance of a behaviour. Perceived power contributes to a person's perceived behavioural control over each of those factors. Perceived behavioural control is related to a person's perception of the ease or difficulty of performing the behaviour of interest. Perceived behavioural control varies across situations and actions, which results in a person having varying perceptions of behavioural control depending on the situation. This theoretical construct of the theory was added later and created the shift from the Theory of Reasoned Action to the Theory of Planned Behaviour. The latter predicts an individual intention to be engaged in specific behaviour at a particular time and a particular place. However, it does not consider other external factors, which could change the buying behaviour of people. Moreover, it assumes that behaviour remains unchanged over time. The gap in the presented approach leads to the need for a new research theory, the Technology Acceptance Model.

2.4. Technology Acceptance Model

As previously mentioned, models were not entirely acting in accordance with the assumptions and could not be incorporated directly for the adoption of wearable devices. Therefore further literature research focused on a subsequent model, proposed by Davis (1985). His Technology Acceptance Model (TAM), presented in Figure 4, is one of the most frequently used models for research into new information technology acceptance.

Figure 4. Technology Acceptance Model (TAM Model)



Source: Phua et al. (2012).

TAM is considered as an extension of TRA (Theory of Reasoned Action), proposed by Ajzen & Fishbein (1980). It suggests that a number of factors will determine the decision of the users when they are presented with new technology. The acceptability of this system is determined by two important factors, i.e. Perceived Usefulness and Perceived Ease of Use. The attitude towards the use will decide the adopter's behaviour in relation to the new technology in the future. According to TAM, actual use of the technology is affected directly or indirectly by attitude, behavioural intentions and perceived usefulness, and perceived ease of use.

External variables also influence intention and actual use through perceived usefulness and perceived ease of use. TAM proposes that if the technology is easy to use, then it is perceived positively by the user.

Several studies have examined the TAM model to explain consumer behaviour towards smartwatch adoption (Chuah et al., 2016). TAM is used to understand consumer acceptance towards information technologies in the banking industry (Kesharwani & Bisht, 2012). Phua et al.'s (2012) study addresses the behavioural intention to use technology in education. The Technology Acceptance Model explains well the consumer behaviour towards the acceptance of new technology. Building on existing solution (TAM), other external factors, contributing to other variables like Perceived Ease of Use and Perceived Usefulness for the Adoption of smart technology were taken into consideration. Moreover, it was decided to unify the names of impacting factors and create a consistent approach in naming them, therefore in the following part capitalised names will be considered.

3. Proposed model, research methodology and data analysis techniques

A sequential multi-method approach model was adopted and tested with the use of data obtained from the planned consumer survey. In order to ensure content validity, the scales of the survey (open-ended, ranking, 5-point Likert scale questionnaire) were obtained considering the previous studies related to consumer behaviour for smart wearable devices. All these factors are the potential factors that might influence technology acceptance and were adopted from previous research studies. Supported by the previously described study, a research model was developed and tested, based on an analysis of 108 insights from existing and potential users of smart wearable devices. Data were collected

during 37th GITEX (Gulf Information Technology Exhibition) Technology Week (8-12 October 2017), which is an annual consumer computer and electronics trade show, exhibition and conference, taking place in Dubai. Statistical analysis, with the use of Adanco 2.0.1 software was conducted and as a result, structural equation modelling was proposed. Controls used in this study were age, gender, use of any wearable device, employment status, and income. In order to confirm predictions, the below-mentioned hypotheses have been stated:

- H1. Product attributes will have a positive impact on the adoption to use wearable devices.
- H2. Perceived ease of use is positively related to the adoption of wearable devices.
- H3. Perceived usefulness is positively related to the adoption of wearable devices.
- H4. Safety to use is positively related to the intention to adopt wearable devices.
- H5. Behavioural beliefs are positively related to the intention to adopt wearable devices.
- H6. Perceived ease of use is positively related to the perceived usefulness of smart devices.
- H7: Behavioural beliefs are positively related to adoption through product attributes.

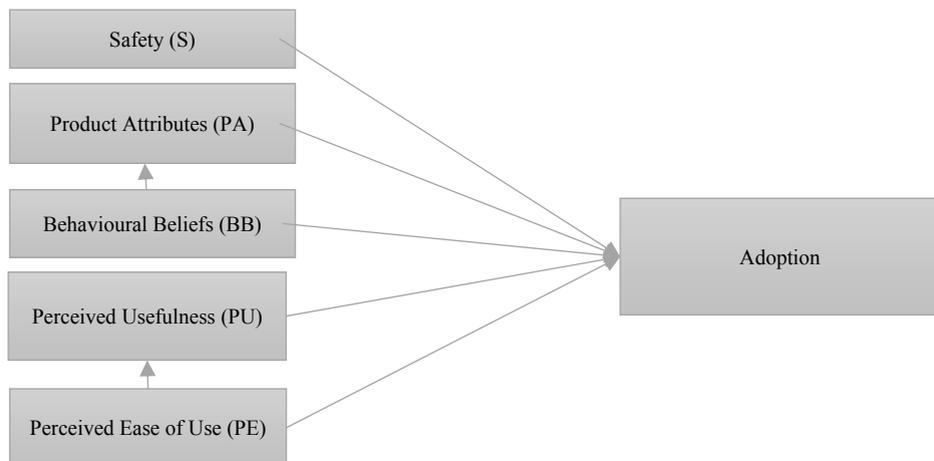
To achieve the purpose of this study and to test the assumed hypotheses, Adanco 2.0.1 advanced analysis of composites package programs was used. With this software, the descriptive analysis was adopted to analyse the results and to find out the demographic characteristics of the sample. Moreover, Cronbach's Alpha (Santos, 1999) was adopted to test the reliability. Confirmatory factor analysis was conducted to prove the validity of each instrument.

Product attributes, such as price, battery capacity and features of the wearable devices shall be considered. To build on this relation hypothesis H1 was proposed. Moreover, these factors were decided to impact the user adoption towards wearable technology. Perceived Ease of Use is concerned with user's perception when using smart wearable devices. For smart wearable to adopt user needs to feel that wearable devices are easy to use. Previous studies have proved, that perceived ease of use is an important factor in determining consumer adoption towards technology. According to TAM model, Perceived Ease of Use also positively affects perceived usefulness, which is defined as the extent to which consumer's beliefs using smart wearable devices increase his/her job performance. The authors of TAM model believe that using these devices increases their efficiency and helps them be organised and productive. Align with the TAM model H2, H3 and H6 were proposed. One of the biggest hurdles, when it comes to

smart devices, would be privacy. With consumer devices connected over the Internet, privacy may be put at risk and, potentially, the user may lose control of their smart appliances with hackers monitoring user's activities. The complexities of wearable devices can foster unknown risks and safety concerns including physical harm to the users. To understand this H4 hypothesis is given. Behavioural Beliefs are another element that facilitates people engagement in getting information. The user needs to have basic skills in how to use wearable devices. It describes what people think of wearables. Some people perceive them as a fashion technology or simply a fashion accessory to wear. To understand better what people think about wearables and whether they are likely to recommend them to their friends in future, H5 hypothesis was created. Prospects may like the idea of using wearable devices, but before buying they may doubt if they will or will not receive the functional value out of. They will consider every aspect of the product which can impact their buying behaviour. Therefore, to study whether Behavioural Beliefs impact buying of a wearable device considering the product attributes, hypothesis H7 was proposed.

As a result of conducted literature study and considering the final list of the factors, own research model was proposed in Figure 5, given below. Based on the proposed research model, remaining in relation to researched factors which have been stated previously.

Figure 5. Proposed sequential multi-method approach research model



4. Research results

The sample was comprised of 54% of male and 46% of female, with age between 18 years and 55 years. Furthermore, 19% of respondents have income more than 11,000 Dhs (approx. \$ 3,000). 46% of the participants were employed. The total of people using a wearable device from the last 1 year to was 2%. Generally, they have been using an accessory type of a wearable device and 55% of the people intend to buy a wearable device in future. On data analysis, it was found, that 43% of the surveyed were concerned about safety matters of wearables use. Almost half of the surveyed (45%) considered product attributes before buying wearable devices. 64% of respondents said that they would not consider behavioural beliefs when buying wearable devices.

Internal consistency was assessed by construct reliability (CR) (Cronbach & Meehl, 1955). All the constructs in the below-mentioned Table 3 exceed the threshold value of 0.7, indicating by the same good reliability.

Table 3. Cronbach's Alpha and convergent validity of the construct (N = 108)

Construct	Cronbach's alpha(α)	Average variance extracted (AVE)
PE	0.7255	0.7845
PA	0.7432	0.7956
PU	0.8575	0.7784
S	0.5373	0.6706
BB	0.7178	0.7798
ADOPTION	0.7551	0.8030

In the first stage of the two-stage analytical procedure (Anderson & Gerbing, 1988; Hair & Black, 1998), a confirmatory factor analysis was conducted to examine the measurement model. It also includes an examination of structural relationships. Three types of validity were tested to assess the measurement model, i.e. content validity, convergent validity, and discriminant validity. Content validity was examined by checking for consistency between existing literature and the measurement data (Bock, Zmud, Kim, & Lee, 2005; Shirish & Thompson, 2007), convergent validity represents the extent to which the various items under each construct measure the similar concept (Shirish & Thompson, 2007). It was verified by examining the average variance extracted (AVE), which is the ratio of construct variance and the total variance among indicators (Hair & Black, 1998). The threshold accepted value for the AVE, for each independent construct, should be equal to or above 0.5, thus, the measurement requirements of the model were satisfying.

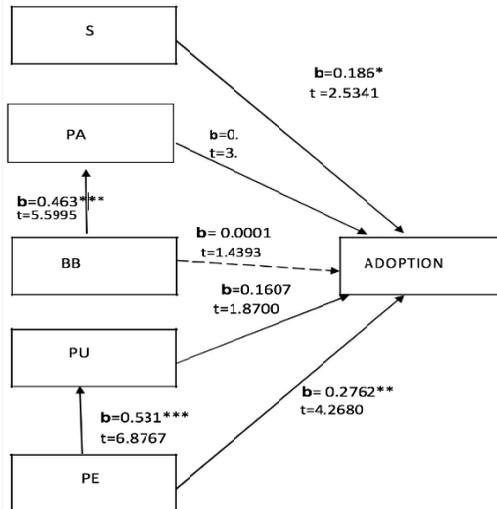
Finally, discriminant validity was verified by calculating the square root of AVE, as suggested by Fornell & Larcker (1981). All the highlighted values are the square root of AVE and confirm discriminant validity since all these values are greater than the inter-construct correlations. Discriminant validity was also established by considering loadings and cross-loadings. Variables were compared with other construct and examined for their degree of differentiation. Table 4 below shows that the model proves discriminant validity.

Table 4. Discriminant validity (N = 108)

Construct	PE	PA	PU	S	BB	Adoption
PE	0.8857					
PA	0.4703	0.8920				
PU	0.5312	0.4243	0.8823			
S	0.4218	0.2364	0.4277	0.8189		
BB	0.5211	0.4628	0.3948	0.3765	0.8831	
Adoption	0.5950	0.5714	0.5268	0.4491	0.4300	0.8961

After validating the measurement model, all the hypotheses were tested using Adanco. The results of the analysis are depicted in Figure 6.

Figure 6. Analysis result from Adanco outputs (N = 108)



Gathering all before mentioned findings, as it is visualised in Table 5, it can be noticed that Product Attributes (PA) (path = 0.329, $t = 3.6733$, $p < 0.05$), Perceived Ease of Use (PE) (path = 0.276, $t = 4.2680$, $p < 0.05$), Perceived Usefulness (PU) (path = 0.161, $t = 1.870$, $p = 0.0309$), Safety (S) (path = 0.186, $t = 2.5341$, $p = 0.0057$) have significant relationship on Adoption. Having noticed the same allows for supporting hypotheses H1, H2, H3, H4.

Table 5. The relationship between theorised constructs (N = 108)

Hypothesis	Paths	Beta	t	R	Supported
H1	PA -> ADOPTION	0.3293	3.6733	0.5208	YES
H2	PE -> ADOPTION	0.2762	4.2680	0.5208	YES
H3	PU -> ADOPTION	0.1607	1.8700	0.5208	YES
H4	S -> ADOPTION	0.1860	2.5341	0.5208	YES
H5	BB -> ADOPTION	0.0001	1.4393	0.5208	NO
H6	PE -> PU	0.5312	6.8767	0.2822	YES
H7	BB -> PA	0.4628	5.5995	0.2142	YES

However, Behavioural Beliefs (BB) (path = 0, $t = 1.4393$, $p = 0.4995$) in the light of conducted research and statistical analysis do not have a significant relationship on Adoption. Similarly, Perceived Ease of Use (PU) (path = 0.531, $t = 6.8767$, $p < 0.05$) shows a positive relationship with perceived usefulness. Moreover, Behavioural Beliefs (path = 0.463, $t = 5.5995$, $p < 0.05$) shares a positive relationship with product attributes. Thus, supporting hypotheses H6 and H7. The table above (cf. Table 5) indicates detailed values and provides rationale in drawing conclusions on relationships between different elements of the theorised constructs.

5. Conclusions

With the increasing importance of the Internet of Things and a growing number of connected devices, smart technology, especially in terms of wearables is growing in importance (Wade, 2017). According to Business Wire (2018), wearable technology will not only have a strong impact on health care and medicine, but will drastically influence manufacturing industry and logistics. According to Juniper Research (2017), advertising on smartwatches will be a growing trend for digital marketers by 2022.

The objective of this study was to understand the factors influencing the adoption of wearable devices in Dubai. It aimed at understanding, if customers would, driven by impulse, buy such a device for regular use. Contrarily, do they need special awareness of the usage of smart devices and being educated about the long-term benefit of their use? Focusing on research, based on previously analysed available models (TRA, TPB, TAM) factors, own research model was developed and tested by quantitative analysis of the data collected from 108 respondents from existing and potential users of smart wearable devices. The results indicated that the influencing factors – Safety, Product Attributes, Perceived Ease of Use are strongly influenced, showing that these factors are considered while buying wearable devices. Moreover, Behavioural Beliefs have a strong impact on Product Attributes, therefore effecting purchase intention. The research provides a new perspective of the influencing factors, which subsequent product developers could consider while planning their product-mix and promotion-mix strategy and promoting their smart devices.

The research shows clearly that three factors: Product Attributes, Perceived Ease of Use and Safety have the strongest influence towards the adoption of wearable devices. Therefore, having said this, smart devices' manufacturers should focus on these factors, while communicating the same to customers, which in turn would help them to take a purchasing decision. The results indicated that the influencing factors – Safety, Product Attributes, Perceived Ease of Use are strongly influenced, showing that these factors are considered while buying wearable devices. Additionally, Behavioural Beliefs have a strong impact on product attributes, thereby effecting Purchase Intention.

Based on the outputs of the conducted research, a practical guidance can be provided. This study contributes a unique approach for solution/technology/product makers as well as sales representatives, to mould and pitch the product in a more effective manner. It allows companies to understand which factors contribute towards biggest fears of prospects and which allow leveraging the company's offering.

Despite the fact of the booming numbers of smart devices, the theoretical gap is clearly visible in the literature. Due to limited research existing in this regard, the paper provides a new perspective on the influencing factors, of which the developers can make use when planning their strategy and promoting their smart devices. Moreover, constructed on achieved results, the study proposes a new model of adoption of technology, based on researched factors such as Perceived Usefulness and Attitude towards smart wearable devices influenced by Perceived Ease of Use and Perception towards new technology.

The research, however, was limited in its findings in a couple of ways. First of all, for this study, the data were collected based on a survey conducted among GITEX participants, with a convenience method. As sampling was not random, hence the sample outputs and obtained results are not predestined to generalise on entire city's population. Moreover, the study was conducted only through filling in an online survey. Due to time constraints and limited financial means, other methods such as an in-depth interview or focus group interviews were not conducted. A future study could include personal interviews as well to gain an in-depth understanding of consumer behaviour. If possible, random sampling method for survey participants should be selected by default, to achieve opportunity of generalising obtained results on the population.

Although the definite list of variables has been identified, relevant for the study on adoption of wearable devices in Dubai, future studies could explore additional variables such as Satisfaction, Trust and Perceived Value to improve the predictive capability of the model. Last, but not least, an experimental study might be also conducted, in which consumers, users and prospects could feel, touch and test available wearable technology.

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