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Taxonomy of Wearable Devices:
A Systematic Review of Literature

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ABSTRACT

This article presents a detailed analysis of research in the field of adoption of wearable devices by taking into consideration existing literature and related theories, frameworks, research methods, type of wearable device under study, geographical distribution, type and level of analysis. A systematic review of related research has been conducted by exploring databases like Elsevier, Emerald, Springer, Sage, Taylor and Francis, the Wiley Online Library, the IEEE, etc., to find articles between 1990 and 2018. A total of 118 articles have been synthesized and reviewed for the analysis. The results show that most of the studies undertaken so far have been empirical and quantitative in nature. A majority of studies focus on more developed nations like USA and show the increasing demand of wearable devices for entertainment, healthcare and fitness purposes. The scope for future research seems to be bright as studies are showing an increasing trend of more studies from the past few years.

KEYWORDS

Applications of Wearable Devices, Classification, Information Technology, Internet of Things, Level of Analysis, Technology Adoption, Theories of Technology Acceptance, Wearable Technology

INTRODUCTION

Wearable technology has been in existence in many forms. Its efficacy has been acknowledged by industries, such as military and healthcare, that could manage its scale and meet the expense for its implementation effectively. In recent years, wearables are gradually and steadily finding acceptance as a mass product. In developed nations, they have emerged as the most prevalent personal care devices allowing the user to manage the health and routine chores efficiently anywhere at any time, combining the features of both fashion item and information technology product. The most common devices are fitness trackers, smartwatches, eyewear, healthcare devices etc. Wearable Technology Market will be worth USD 71.23 Billion by 2021 as per a report by Scalar Market Research (2016). As a result, competition between global wearable devices market players like Apple, Google, Fitbit, Jawbone etc. is outrageously increasing.

In the field of academic research, a few authors have conducted review of the extant literature about wearable devices. Khakurel et al published a paper recently in 2018 that identifies 23 categories of wearable devices that have been used in the work environment for activities including monitoring,

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augmenting, assisting, delivering and tracking based on the review of 34 selected papers (Khakurel et al, 2018). Following the similar path, a review paper by King and Majid (2017) classifies smartwatch-based healthcare applications like activity monitoring, chronic disease self-management, nursing or home-based care, and healthcare education based on selected 27 articles. Another paper reviews various applications of wearable technology for personalized construction safety monitoring (Awolusi et al., 2018). Kalantari, 2017 synthesize the literature of consumers' adoption of wearable technologies in order to review the adoption theories and identify the influential factors in the adoption decision. A study by Vichitvanichphong et al. (2014) summarizes and categorizes the factors influencing the adoption of assistive technologies among seniors by systematically reviewing 104 selected researches. Chan et al. (2012) presented a cited report review instead of a systematic review by focusing on the current research and development of and the challenges facing (smart wearable systems) for HM (health monitoring). Despite being insightful, it has been observed that most of these studies focus on only one particular application of wearable technology like healthcare, construction etc.

The highly promising, indispensable and increasing role of wearable devices in individuals' lives has motivated the authors to understand and investigate their current role and future prospects worldwide. The objective of the paper is to analyze and classify the literature comprehensively from varied dimensions. These dimensions include level of analysis, structure of the papers, research methodology, and geographical distribution, type of wearable device under study and application of different theories of technology acceptance. By doing so, this study will not only contribute towards comprehensive knowledge towards the field but will also encourage the practical adoption of these devices. It will also commence a new path for future studies in the related areas. The objective of this study is to study the past pattern, emerging trends and future scope in the field of wearables by filling the research gaps like lack of awareness about under-researched areas of wearable technology, limited understanding about theories, frameworks and methodologies that have been applied so far in context of wearables literature.

This paper is divided into following parts: First, this study begins with the overview of fundamentals, attributes, applications and worldwide demand of wearable devices in general. After that, it focuses on methodology: research questions, information sources and guidelines for literature classification and then it presents the findings followed by discussions and implications of the review. The conclusion and scope for future research has been discussed in the last section.

WEARABLES: AN INTRODUCTION

The entire world of wearables has taken a new shape in today's digitalized era. They are no longer considered as items which are worn on body rather they have been identified as smart accessories in the form of smartwatches, head mounted displays, activity trackers, smart garments etc. The purpose of these devices is to include a portable and functional computer or electronics into people's daily lives effortlessly (Wright & Keith, 2014). Although they perform the same functions as existing popular devices such as laptops and smart phones, their performance is much more advanced in terms of their sensing, scanning features and feedback in real time (Tehrani and Michael, 2014). Several attempts have been made by various researchers to define wearable devices. They are the electronic computers that can be worn, carried or attached to body (Buenaflor and Kim, 2013). Morris (2015) defined wearable devices as electronics or computers that can be worn on the body when inserted into items of clothing and accessories. In this study, a wearable device is defined as a device which can be worn and has the capability of incorporating information technology so that one can communicate and process information on the go (Kalantari, 2017; Park, Chung, & Jayaraman, 2014).

Some authors consider the abacus necklace as the first wearable, introduced in 1600s. Other references for wearable devices can be identified from a sixteenth-century abacus ring, the first wristwatch of the Queen of Naples which she wore in 1810, and the shoes for cheating purpose in

casinos in the 1960s (Lipman, 2014). From gaming to utilitarian benefits, wearable devices tend to improve hedonic pleasure and quality of lifestyle. In order to be effective, a wearable device should possess these two key attributes: Physical attributes and Functional attributes. Physical attributes require a wearable to be lightweight, aesthetically pleasing, invisible and shape comfortable while functional attributes want it to be multi-functional, configurable, responsive and have sufficient data bandwidth (Park et al., 2014). Not only this, Motti & Caine (2014) has listed 20 principles or attributes which focuses on development of human centric design for wearables like aesthetics, affordances, comfort, contextual-awareness, customization, ease of use, privacy, satisfaction etc.

It is not surprising that one can make use of wearables in number of fields like entertainment (Headsets, Smartwatches, Fitness trackers), healthcare, surgeries, sports, home based care, big data analytics, public safety or emergency care, entertainment, military, information processing, posture tracking, pressure sensing, airlines, fashion, financial services, art galleries, firefighting, retailing, law enforcement, political campaigning, etc. (Buenaflor & Kim, 2013; Morabito, 2016; Park et al., 2014; Thierer, 2015). Today, the most commonly used wearable devices are activity trackers and medical wearable devices. These devices help the users in identifying disease and disorder symptoms (DDS), general vital signs (GVS), fitness, steps count, distance travelled, calories burned, stress level (ST), mood/feeling (MF), pose and posture (PP), sleep pattern (SP), location, work productivity (WP), and time management skills (TM) (Koo & Fallon, 2017).

Gartner, Inc. had projected the sales of total 41.5M smartwatches in 2017, adding that the sales of all wearable form would increase multifold from 2019 to 2021. According to Gartner, smart watches will depict 30 percent of total smart watch units until 2021. The sales for Bluetooth headsets would increase while head mounted displays (HMD) would remain at infancy stage in coming one or two years. According to data from the International Data Corporation (IDC) Worldwide Quarterly Wearable Device Tracker, the market's growth will be exclusively because of smartwatches and wrist-worn fitness trackers. There is a need to investigate if the adoption of emerging wearables is as per the prediction. What factors affect adoption of innovative products and solutions? What is the theoretical explanation of such adoption? These and other issues shall guide the review of literature.

METHODOLOGY FOR REVIEW OF LITERATURE

A systematic review of literature synthesizes and classifies all of the academic research on a particular theme in an unbiased, transparent and presentable way to identify research gaps and provide evidence for practice and policy-making (LibGuides, 2018).

Research Questions

Keeping in mind the objective of the study i.e. to analyze and classify the wearables' literature comprehensively from varied dimensions (as discussed in Section 1), this study aims to answer the following questions:

RQ1: What is the level of analysis that has been conducted in the literature so far in context of wearables?
RQ2: What is the chronological trend and geographical spread of publications in the related field so far?
RQ3: What are the research methodologies that have been applied in literature so far in context of wearables?
RQ4: What are the different types of applications in which wearable devices have been utilized?
RQ5: What are the technological acceptance theories that have been applied in the literature for adoption of wearable devices?

Information Sources and Selection Criteria

In order to find reliable and valid studies with respect to wearable devices, literature search was done for the use and adoption of these devices in the databases like Elsevier, Emerald, Springer, Sage, Taylor n Francis, Wiley Online Library, IEEE, Decision Sciences, etc. from the year 2000 to 2018, when the literature search was conducted in three steps.

In the first step, the identified keywords searched were "smart wearable devices", "wearable devices application", "adoption of wearable devices", "behavioral intention to use wearable devices", etc. In the second step, the following set of inclusion criteria (IC)were applied to select the significant articles: IC1: Date of publication between 1/1/2000–31/08/2018; IC2: Includes answers to one of the research questions; IC3: talks about at least one application of wearable devices; IC4: in order to get comprehensive and concentrated literature, studies from reference lists of selected studies were also tried to be included; IC5: Wherever more than one paper by same authors are available, only the most latest one is selected; IC6: The search was limited to studies or translations available in English language. In the third step, selected articles (118 out of 387 articles) from the literature search were studied and classified into different categories.

Guidelines for Classification

Wearables are relatively novel, emerging and multifaceted technology, thus creating classification guidelines for review of its literature is demanding as well as effortful as all the dimensions must be taken into consideration. So, the guidelines for classification for wearable studies has been adapted from Zhang, Luo, Nie, & Zhang (2017). This study classifies the level of analysis conducted in the studies in the context of wearables into three categories: macro level, meso level and micro level. Macro category includes studies on summary and application of the wearable technology. One such study, Morabito (2016) introduces the reader to the basic terms and concepts of the wearable technology, its history, trends, implications and wide range of applications. The Meso category focuses on the technical level i.e. functional description and technical implementation of the wearable technology and devices. In this category, one of the papers by Lewis & Neider (2017) talks about why is it necessary and how is it possible to design wearables for aging population. Micro, which is the last category, talks about consumption at micro level i.e. Consumers' intention and behavior towards wearable technology. Further, the 118 papers have also been classified on the basis of year of publication, structure of the paper, research methodology, and geographical distribution, type of wearable device under study and application of different theories of technology acceptance.

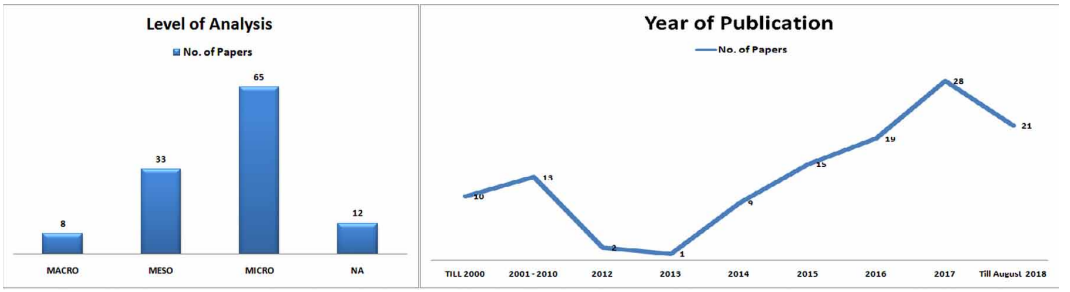
PRESENTATION OF FINDINGS

Level of Analysis

Figure 1 (left) shows that out of (118) studies, micro level of analysis was conducted in (65) papers, followed by meso level of analysis in (33) papers and macro level of analysis only in (8) papers. Although, no level of analysis could be identified in (12) papers (depicted by NA) from wearables point of view as they are broad theory-based papers.

From micro i.e. acceptance or adoption perspective, diverse set of factors have been identified by varied researchers like perceived ease of use, perceived usefulness, attitude, brand, price, compatibility, accessibility, mobility, perceived benefits, innovativeness, relative advantage, perceived enjoyment, functional congruence etc. that would promote the adoption of wearable devices among users (Gu, Wei, & Xu, 2016; Hsiao, 2017; Kim & Shin, 2015; Li, Wu, Gao, & Shi, 2016; Mercado, 2018; Nasir & Yurder, 2015; Zhang et al., 2017). Some of the factors like privacy, risk, trust, physical safety concern, cost, etc. also hinders consumers' intention to accept these devices (Kalantari, 2017; Kalantari, Rauschnabel, & Head, 2017; Rauschnabel et al., 2016). Macro level studies which relate to fundamentals and market for wearables include articles like

Figure 1. Literature classification by level of analysis (left) and chronological trend: Year of publication (right)



Baker, Hong, & Billinghurst (2014); Morabito (2016); Park et al. (2014); Summerton (2016). Some of the meso level studies which talk about the technical and functional aspects of wearables are given by Awolusi, Marks, & Hallowell (2018); Casselman et al. (2017); Hwang, Seo, Jebelli, & Lee (2016) Papi, Osei-Kuffour, Chen, & McGregor (2015).

Chronological Trend of Papers

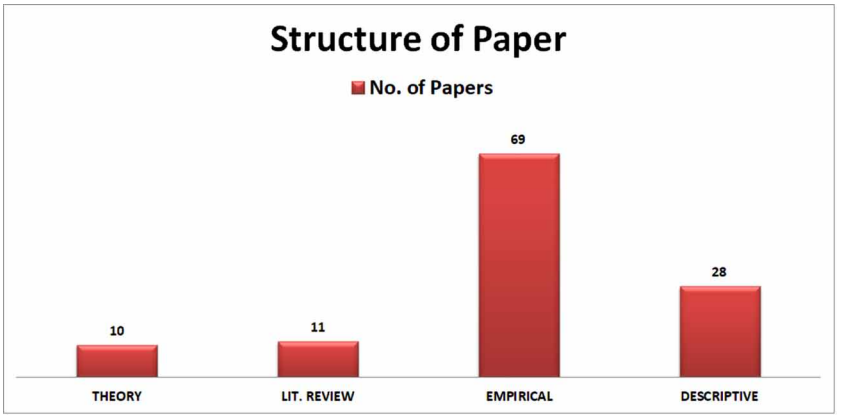
The chronological trend of the publication of papers in the field of wearable devices has been shown in Figure 1 (right). The trend shows the growing importance of this field in past few years: from only (1) study in the year 2013 (Turhan, 2013), the studies have started to increase in multifolds to (9) in 2014, followed by (15) in 2015, (19) in 2016 and (28) in 2017. The maximum number of studies in the field have been published in the year 2017 i.e. (28) out of (111) studies (Do, Martini, & Choo, 2017; Kalantari et al., 2017; Karamaki, Lahtinen, & Tuominen, 2017; Koo, 2017; Liu & Guo, 2017; Zhang et al., 2017). Also, it is not surprising that (21) major studies have been published in first eight months of 2018 (Awolusi et al., 2018; Lee & Lee, 2018; Mercado, 2018; Schall, Sesek, & Cavuoto, 2018) predicting that the literature is immensely going to increase in future. There is reason to believe that research in wearables is gaining momentum reflecting the shift from technology development stage to commercialization.

Structure of the Paper and Research Methodology

Talking about the structure of the paper, this study has identified four structures: a) Theory based conceptual paper, b) Empirical Paper, c) Literature review paper and d) Descriptive (and/or Case study) paper. Structure based classification of literature has been shown in Figure 2. It is interesting to note that most of the papers are empirical in nature; i.e. (69) out of (118) (Cheng & Mitomo, 2017; Gao et al., 2015; Rauschnabel et al., 2015; Rupp, Michaelis, McConnell, & Smither, 2016; Zhang et al., 2017), followed by (28) descriptive papers (Henning & van de Ven, 2017; Mann, 2003; Park et al., 2014), (10) theory based papers (Davis, 1989; Goodhue et al., 1995; Morris et al., 2003; Parasuraman, 2000; Rogers, 1995; Venkatesh, Davis, Venkatesh, & Davis, 2000) and (8) literature review papers (Casselman et al., 2017; Chan, Estève, Fourniols, Escriba, & Campo, 2012; Kalantari, 2017; Turner, Kitchenham, Brereton, Charters, & Budgen, 2010). Higher percentage of empirical papers indicate its significance for researchers and corporate actors with implications for the adoption of future wearable technology. As, literature review studies are very less and even these (11) cover specific kinds of wearable devices, this study can be set as a benchmark as far as comprehensive review of literature towards wearable devices is concerned.

In relation to the research methodologies applied, only limited set of techniques have been observed. Quantitative techniques have been applied in (47) papers (Basoglu, Ok, & Daim, 2017; Choi & Kim, 2016; Jeong, Kim, Park, & Choi, 2017;Marakhimov & Joo, 2017; Wu, Wu, & Chang, 2016), followed by testing/experiment/simulation technique in (12) papers (Chaffin et al., 2017; Knight &

Figure 2. Literature classification by structure of paper

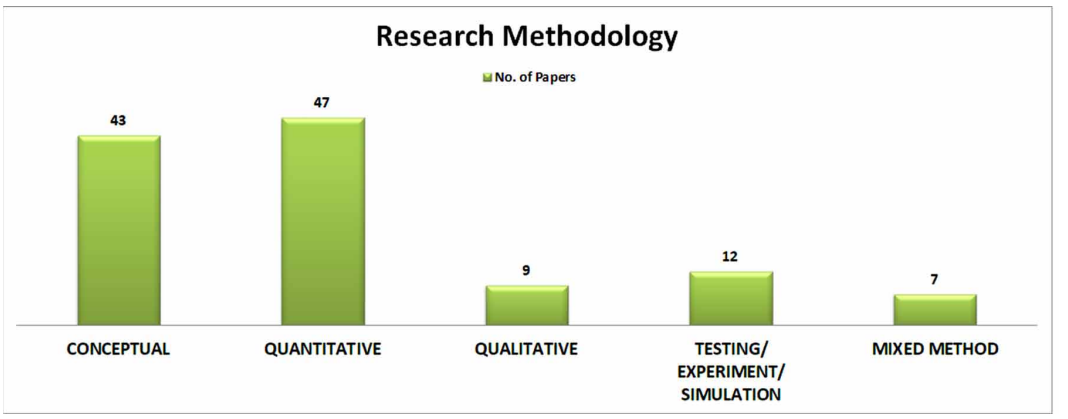


Baber, 2005;Kreitzberg, Dailey, Vogt, Robinson, & Zhu, 2016; Muaremi, Arnrich, & Tröster, 2013; Nasiopoulos, Risko, Foulsham, & Kingstone, 2015; Samost et al., 2015), qualitative techniques in (9) papers (Hassan, Ekiz, Dadwal, & Lancaster, 2017; King, Christine E. & Majid, 2017; Sawyer et al., 2014) and mixed or combination of methods in (7) papers (Brun, Ferreira, Gouin-Vallerand, & George, 2017; Kerner & Goodyear, 2017; Mercado, 2018; Park & Koh, 2017). Although (43) papers talk about different dimensions of wearables without applying any definite research technique in their studies and hence, they are categorized under conceptual category Figure 3.

Geographical Distribution

Majority of the researches have applied global perspective in their studies. In other words, they do not aim any individual, organization, or country. Hence, they have been placed under universal category accounting for (48) studies out of (118) (Buenaflor & Kim, 2013; Henning & van de Ven, 2017; Mercado, 2018; Morabito, 2016; Norman, 2013; Park et al., 2014; Summerton, 2016). Apart from this, maximum studies i.e. (31) have taken place in USA (Brun et al., 2017; Karapanos, Gouveia, Hassenzahl, & Forlizzi, 2016; Kreitzberg et al., 2016; Sawyer et al., 2014; Wu, Fan, & Mattila, 2015), followed by (10) in Korea (Jung et al., 2016; Kaewkannate & Kim, 2016; Kim & Shin, 2015) and (10) in Europe (Granado-Font et al., 2015; Knight & Baber, 2005; Nasiopoulos et al., 2015). The results

Figure 3. Literature classification by research methodology



are not astonishing because USA being the most technologically developed nation is supposed to have most of the studies. Further, studies in different proportions have been conducted in context of other countries like Australia (Vichitvanichphong et al., 2014), China (Jiang, Fei and Huang, 2017), Japan (Lee, Sohn, Usami, & Hamanaka, 2010), Taiwan (Hsiao, 2017), Turkey (Nasir & Yurder, 2015), India (Aurva, 2017) respectively. The graph depicts the respective classification in Figure 4. The emerging economies and their dominance in semiconductor and electronic based devices is evident. Against 18 papers from China and Korea, we found only ten papers from Europe.

Type or Application of Wearable Device

Another category of literature classification has been shown by Figure 5. As it has been already discussed that wearable devices are of different types. So, it becomes important to study how many researches have been conducted on different types of wearable devices. Most of the studies, (39) out of (118) talk about wearable technology in general and do not focus specifically on any particular wearable device type, followed by emphasis on healthcare devices in (21) studies (Casselman et al., 2017; Nasir & Yurder, 2015; Piwek, Ellis, Andrews, & Joinson, 2016), fitness devices in (14) studies (Kaewkannate & Kim, 2016; Lunney et al., 2016; Michaelis et al., 2016; Page, 2015), HMDs (head mounted displays)/ eyewear in (11) studies (Klonoff, 2014; Rauschnabel et al., 2015; Sawyer

Figure 4. Literature classification by geographical distribution

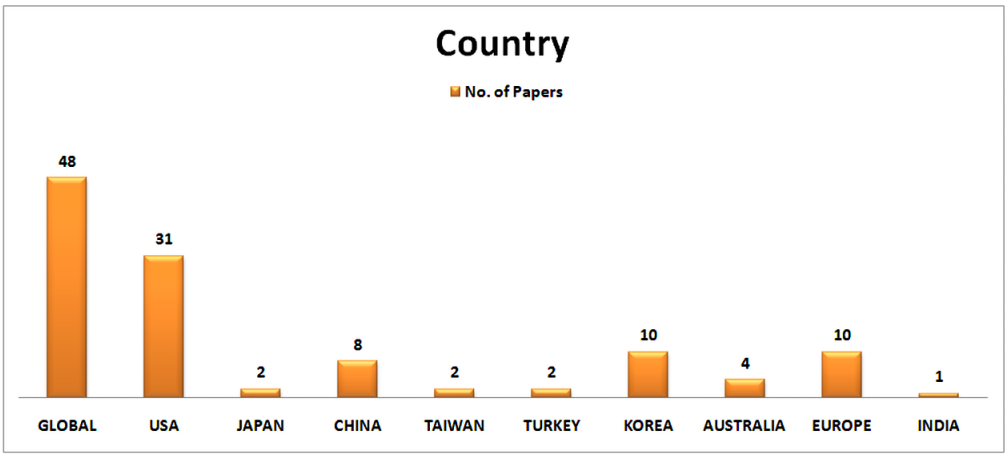
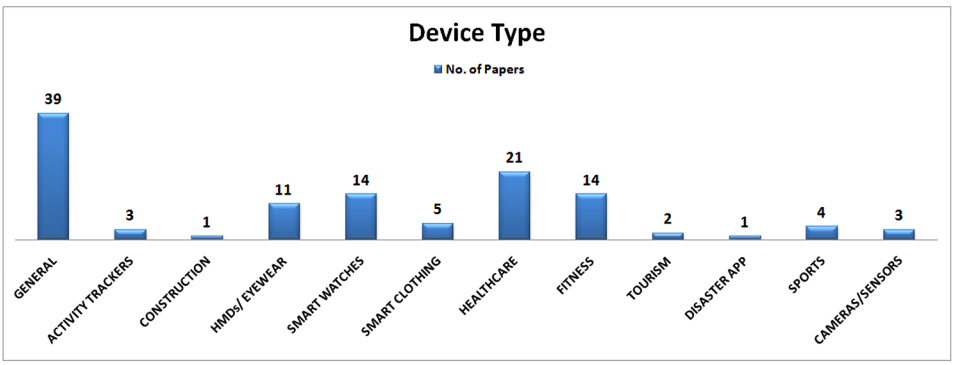


Figure 5. Literature classification by type or application of wearable device *general: This category includes papers which talks about the overview of wearable technology in general



et al., 2014), smartwatches in (14) studies (Jung et al., 2016; Migicovsky, Durumeric, Ringenberg, & Halderman, 2014; Samost et al., 2015), smart clothing in (5) studies (Hwang, Chung, & Sanders, 2016; Lee et al., 2015; Mann, 1996), activity trackers in (3) studies (Karapanos et al., 2016; Koo, 2017; Maher, Ryan, Ambrosi, & Edney, 2017), wearable cameras/ sensors in (3) studies (Brown, Blake, & Sherman, 2017; Chaffin et al., 2017). Apart from this, some papers also mention about different kinds of applications of wearables in different fields like construction sites in (1) study (Hwang et al., 2016), tourism in (2) studies (Hassan et al., 2017) and disaster applications in (1) study (Cheng & Mitomo, 2017).

Theories Applied

This literature classification is based on theories or models or frameworks applied in the selected studies (Table 1), particularly looking at adoption process of innovation. The Innovation Diffusion Theory (IDT) is an IT acceptance theory by Rogers, 1965 that explain how, why, and at what rate new technology spread. The Theory of Reasoned Action (TRA) has been used to foresee how individuals will respond to an innovation based on their existing attitudes and behavioral intentions (Ajzen, 1967). The Technology acceptance model (TAM) is another theory given by (Davis, 1989) that explains two factors: perceived usefulness and perceived ease of use, which would lead to user's acceptance of a technology. Task-technology fit (TTF) theory states that a new IT invention is more likely to influence users' performance positively if the proficiencies of the product match the jobs that the user is required to perform (Goodhue and Thompson, 1995). The UTAUT describes user intentions to use an IT product by presenting four key constructs: performance expectancy, effort expectancy, social influence, and facilitating conditions (Venkatesh, 2003). Apart from papers which have not applied any widely known technology acceptance theories (47.5%), the maximum number of papers have applied different versions of TAM i.e. TAM, TAM2, TAM3 accounting for (23.7%) of total studies (Basoglu et al., 2017; Cheng & Mitomo, 2017; Choi & Kim, 2016; Kim & Shin, 2015; Nasir & Yurder, 2015).This has been followed by use of IDT or its extension PCI (Perceived characteristics of innovation) in (10.2%) studies (Gu et al., 2016; Jeong et al., 2017; Wu et al., 2016), UTAUT/ UTAUT2 (Unified Theory of Acceptance and Use of Technology) in (10.2%) studies (Chen & Shih, 2014; Gao et al., 2015; Morris et al., 2003; Wu et al., 2016), TRA (Theory of Reasoned Action)/TPB (Theory of Planned Behavior) in (5.9%) studies (Chen & Li, 2010; Mital, Choudhary, Chang, Papa, & Pani, 2016) and TTF (Technology Task Fit Model) in (2.5%) studies (Hsiao, 2017). As part of the future scope of the work, empirical study can be undertaken to understand the supremacy of TAM Model.

Table 1. Literature classification by theories applied

Theories Applied	Source	No. of Papers	Percentages
TTF	(Goodhue and Thompson, 1995)	3	2.5
TRA/TPB	(Ajzen, 1991)	7	5.9
UTAUT/UTAUT2	(Venkatesh, 2003)	12	10.2
IDT/PCI	(Rogers, 1965)/(Moore and Benbasat, 1991)	12	10.2
TAM/TAM2/TAM3	(Davis, 1989)	28	23.7
OTHERS	-	56	47.5
TOTAL		**118**	**100**

DISCUSSIONS AND IMPLICATIONS

In this study, we have classified and analyzed data from 118 articles from the year 2000 to 2018. The following section presents the answers to the research questions by investigating and analyzing the findings of the systematic review followed by theoretical and practical implications of this study for various stakeholders.

Discussions

RQ1: What is the level of analysis that has been applied in the literature so far in context of wearables?

The findings show that majority of the studies have conducted the micro level of analysis i.e. towards understanding consumers' intention to accept wearable technologies by consolidating various adoption related factors. This was bound to happen as micro level talks about actual and potential adoption of wearable devices by the consumers. Both product developers as well as academicians want to create widespread awareness and acceptance of these devices so that more and more people can reap their benefits. The second category i.e. meso level of analysis is also conducted in significant number of papers because being a relatively novel phenomenon, wearable technology is evolving into varied range of products and hence, it becomes crucial to understand technicalities and functionalities of such diverse applications and efficiencies of these devices. Finally, the third category i.e. macro level of analysis is conducted in least number of studies as such studies are descriptive in nature and usually prevalent during the initial phase of the technology.

RQ2: What is the chronological trend and geographical spread of publications in the related field so far?

The number of studies on wearable devices pertaining to various fields reflects a rising trend in recent years. They have increased multi-fold from (1) study in year 2013 to (28) studies in 2017. The reason behind this could be the launch of the different wearable devices (e.g. fitness bands, smartwatches, smartglasses) by major companies like Google, Apple, Samsung, and Pebble Steel in the year 2014. Forbes even declared the year 2014 as "the year of the wearable" and predicted that the technology is going to be much bigger with time, which seems to be true after looking at the increasing number of studies in the past few years and it is easy to predict that more studies will be undertaken in coming years. The other facilitators for smart wearable devices are the smartphones and internet. Reduced cost and greater availability of these two in recent years have increased their popularity worldwide.

It is further revealed that geographical focus of extant literature is not evenly distributed all over the world. The studies are more concentrated in developed regions like USA. This is because USA is not only a thriving place for innovative engineers, tech enthusiasts and business makers but also serves as a home to majority of early adopters. Along with private sector, USA government is also playing an active role in promotion and development of new technologies. (Brown, 2018). Wearable devices are at the initial stage of their commercialization, especially in emerging economies like India and Turkey, etc., some more time is required for wearables to become popular in these regions. The authors believe that wearable technology can become a viable tool towards narrowing the digital divide between developed and developing nations. Therefore, in our view, researchers from developing nations should positively contribute in this direction.

RQ3: What are the research methodologies that have been applied in literature so far in context of wearables?

In context of paper structure, the extant literature is more in the form of empirical studies while studies in the form of theory formulation and literature reviews are very few. It has been observed that the number of quantitative studies is much higher than qualitative, testing/simulation/experimental or any other kind of studies. This is because quantitative researches are considered more scientific and unbiased while qualitative researches use methods like biographies, interviews, case studies which rely more on individual's bias and hinder researchers from gaining popular perspective. Hence, quantitative studies are more appropriate in the context of wearables in order to understand viewpoint of masses towards the adoption of the new technology. Moreover, majority of the studies have not used any specific technique. One reason could be the novelty of the concept of wearables from the research perspective.

RQ4: What are the different types of applications in which wearable devices have been utilized?

Different researchers have focused on different types of wearable devices in their studies. Apart from studies that talk about overview of wearable technology in general, majority of the studies have been taken place on smart watches, eyewear, and health and fitness devices. This is because these are the most common devices that allow users to increase their performance efficiency and take care of their personal well-being simultaneously. These devices perform various functions such as social networking, navigation, activity/fitness tracking (diet intake, distance travelled, heart beat monitor), visualization, communication, task coordination etc. Marketers need to assimilate the inputs from such studies and combined with inputs from research syndicates plan business ideas for future accordingly. Other applications of wearable devices have been identified in the field of tourism, disaster applications, professional sports, military, financial services etc. But researches in these fields are very few or close to zero leaving the wide scope of opportunities for future studies and new applications.

RQ5: What are the technological acceptance theories that have been used in the literature for adoption of wearable devices?

Researchers have relied on widely used technology acceptance theories like TAM, UTAUT, etc. Among these, TAM is used in maximum number of studies because TAM is considered as the successor of various older theories like TRA, TPB, IDT etc. TAM elucidates two impactful constructs that would intrinsically motivate the users to develop positive attitude towards acceptance of new technology: perceived usefulness, perceived ease of use also referred as self-efficacy and performance expectancy. These two factors serve as the important determinants for adoption of any new IT product or service. Researchers generally modify TAM by adding new variables depending on the product type and other characteristics. Even UTAUT model has been developed after integrating variables of TAM with other variables. New researchers must keep these well-established models and frameworks in their studies as a foundation and adapt them accordingly for better results.

Theoretical Implications

This study is a successful attempt towards making significant contributions to prior literature in the related field. First, this study provides comprehensive review of wearable devices issue, which is different from prior related studies. Prior studies generally focus on particular application, dimension, region or particular theoretical framework for adoption of these devices. Secondly, this study has the potential to provide deeper understanding about how researches are evolving in the related field over time in different regions of the world. Thirdly, this study will serve as a guide to future researchers by identifying which are the under researched area in the related field giving the direction to future studies. For example, from the classification, it is clear that there is a need to conduct more meso level studies in the area of wearable devices in disaster applications.

Practical Implications

This study also provides significant practical implications for various stakeholders: product developers, business managers, policy makers and end-users. Firstly, new product developers can seek ideas on which applications of wearable devices to focus on to create new offerings for consumers. Secondly, business managers can improve their marketing campaign and build enhanced esteem and loyalty for their products through improved quality and services by taking clues from the factors of adoption of the most prevalent "technology-acceptance theories", for instance, perceived usefulness and perceived ease of use of TAM. Thirdly, policy makers can promote the adoption of fitness, sports, healthcare, and safety wearable devices among consumers by guiding them about how using these devices can improve their well-being as an individual or society as a whole. The government should invest in related R&D and should allow imports and exports of these devices at concessional rates. For example, government can promote the use of wearable devices in tourism to attract foreign tourists or aware local people about how to use these devices in disaster prone areas, etc. Finally, from an end user's perspective, this study will provide an insight about intricacies of new technology: its applications, benefits, availability and viability for his long-term welfare.

CONCLUSION AND SCOPE FOR FUTURE RESEARCH

This study presents a systematic review of wearables' related studies. First, we provided a brief overview about wearable devices; fundamentals: definition, history, attributes, applications etc. Then, the study identified journal articles from significant databases and after following a meticulous process of review, the selected 118 studies have been critically classified on various grounds. The authors have conducted the review of literature on wearables in a way that would help researchers and practitioners to take a closer look at the growth trajectory, geographical spread and applicability of the technology landscape of wearables.

It is important to state that this study does not include entire set of related literature, as only selected peer reviewed articles from the period of 2000 to August 2018 have been included in this study. Therefore, the scope for future research in the field is enormous from varied dimensions. Currently, most of the studies discuss about applications and usability of wearable devices. Future studies can focus more on their technical functionality and testability for wider reach in different emerging fields apart from health, fitness and entertainment. One can also develop, apply and test the compatibility of different existing or new research frameworks and wearable devices. Overall, there is no doubt that wearable devices have a bright future in terms of exploding the consumers' electronics market all over the globe. The right blend of acceptable designs by product developers and researches by academicians' and market analysts would pave a much stronger and needed path for development and acceptability of wearable devices in order to enhance humans' efforts, utilities and capabilities.

REFERENCES

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179–211. doi:10.1016/0749-5978(91)90020-T

Aurva, V. (2017). Role of Smart Devices and Wearables in the Digital India Vision. *DQ India*. Retrieved from http://www.dqindia.com/role-of-smart-devices-and-wearables-in-the-digital-india-vision/

Awolusi, I., Marks, E., & Hallowell, M. (2018). Wearable technology for personalized construction safety monitoring and trending: Review of applicable devices. *Automation in Construction, 85*(October), 96-106. doi:10.1016/j.autcon.2017.10.010

Baker, M., Hong, J., & Billinghurst, M. (2014). Wearable Computing from Jewels to Joules [Guest editors' introduction]. *IEEE Pervasive Computing*, *13*(4), 20–22. doi:10.1109/MPRV.2014.81

Basoglu, N., Ok, A. E., & Daim, T. U. (2017). What will it take to adopt smart glasses: A consumer choice based review? *Technology in Society*, *50*, 50–56. doi:10.1016/j.techsoc.2017.04.005

Brown, A. (2018). The Top 9 Countries in Wearable Tech Innovation. *Wearable Technologies*. Retrieved from https://www.wearable-technologies.com/2016/03/the-top-9-countries-in-wearable-tech-innovation/

Brown, N. A., Blake, A. B., & Sherman, R. A. (2017). A Snapshot of the Life as Lived: Wearable Cameras in Social and Personality Psychological Science. *Social Psychological & Personality Science*, *8*(5), 592–600. doi:10.1177/1948550617703170

Brown, Susan A. and Venkatesh, V. (2005). Model of Adoption of Technology in Households: A Baseline Model Test and Extension Incorporating Household Life Cycle. *MIS Quarterly, 29*(3), 399–426.

Brun, D., Ferreira, S. M., Gouin-Vallerand, C., & George, S. (2017). A mobile platform for controlling and interacting with a do-it-yourself smart eyewear. *International Journal of Pervasive Computing and Communications*, *13*(1), 41–61. doi:10.1108/IJPCC-02-2017-0011

Buenaflor, C., & Kim, H. C. (2013). Six human factors to acceptability of wearable computers. *International Journal of Multimedia and Ubiquitous Engineering*, *8*(3), 103–114.

Casselman, J., Onopa, N., & Khansa, L. (2017). Wearable healthcare: Lessons from the past and a peek into the future. *Telematics and Informatics*, *34*(7), 1011–1023. doi:10.1016/j.tele.2017.04.011

Chaffin, D., Heidl, R., Hollenbeck, J. R., Howe, M., Yu, A., Voorhees, C., & Calantone, R. (2017). The Promise and Perils of Wearable Sensors in Organizational Research. *Organizational Research Methods*, *20*(1), 3–31. doi:10.1177/1094428115617004

Chan, M., Estève, D., Fourniols, J. Y., Escriba, C., & Campo, E. (2012). Smart wearable systems: Current status and future challenges. *Artificial Intelligence in Medicine*, *56*(3), 137–156. doi:10.1016/j.artmed.2012.09.003

Chen, C., & Shih, H.-S. (2014). A Study of the Acceptance of Wearable Technology for Consumers -An Analytical Network Process Perspective. *International Journal of the Analytic Hierarchy Process*, 1–5.

Chen, K., Zdorova, M., & Nathan-Roberts, D. (2017). Implications of wearables, fitness tracking services, and quantified self on healthcare. *Human Factors: The Journal of the Human Factors and Ergonomics Society,* (*October)*, *1066–1070*. doi:10.1177/1541931213601871

Chen, S., & Li, S. (2010). Consumer adoption of e-service: Integrating technology readiness with the theory of planned behavior. *African Journal of Business Management*, *4*(16), 3556–3563. doi:10.1109/PICMET.2005.1509728

Cheng, J. W., & Mitomo, H. (2017). The underlying factors of the perceived usefulness of using smart wearable devices for disaster applications. *Telematics and Informatics*, *34*(2), 528–539. doi:10.1016/j.tele.2016.09.010

Choi, J., & Kim, S. (2016). Is the smartwatch an IT product or a fashion product? A study on factors affecting the intention to use smartwatches. *Computers in Human Behavior*, *63*, 777–786. doi:10.1016/j.chb.2016.06.007

Chuah, S. H. W., Rauschnabel, P. A., Krey, N., Nguyen, B., Ramayah, T., & Lade, S. (2016). Wearable technologies: The role of usefulness and visibility in smartwatch adoption. *Computers in Human Behavior*, *65*, 276–284. doi:10.1016/j.chb.2016.07.047

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *Management Information Systems Quarterly*, *13*(3), 319–340. doi:10.2307/249008

Do, Q., Martini, B., & Choo, K. K. R. (2017). Is the data on your wearable device secure? An Android Wear smartwatch case study. *Software, Practice & Experience*, *47*(3), 391–403. doi:10.1002/spe.2414

Gao, Y., Li, H., & Luo, Y. (2015). An empirical study of wearable technology acceptance in healthcare. *Industrial Management & Data Systems*, *115*(9), 1704–1723. doi:10.1108/IMDS-03-2015-0087

Gartner. (2017). Gartner Says Worldwide Wearable Device Sales to Grow 17 Percent in 2017. Retrieved from https://www.gartner.com/newsroom/id/3790965 as on 15/03/2018

Goodhue, D. L., Thompson, R. L., Goodhue, B. D. L., & Thompson, R. L. (1995). Task-Technology Fit and Individual Performance. *Management Information Systems Quarterly*, *19*(2), 213–236. doi:10.2307/249689

Granado-Font, E., Flores-Mateo, G., Sorlí-Aguilar, M., Montaña-Carreras, X., Ferre-Grau, C., Barrera-Uriarte, M. L., & Lorente Zozaia, A. et al. (2015). Effectiveness of a Smartphone application and wearable device for weight loss in overweight or obese primary care patients: Protocol for a randomised controlled trial. *BMC Public Health*, *15*(1), 2–7. doi:10.1186/s12889-015-1845-8

Gu, Z., Wei, J., & Xu, F. (2016). An Empirical Study on Factors Influencing Consumers' Initial Trust in Wearable Commerce. *Journal of Computer Information Systems*, *56*(1), 79–85. doi:10.1080/08874417.2015.11645804

Hassan, A., Ekiz, E., Dadwal, S. S., & Lancaster, G. (2017). Augmented Reality Adoption by Tourism Product and Service Consumers: Some Empirical Finding. In Augmented Reality and Virtual Reality Empowering Human, Place and Business (pp. 47–64). doi:10.1007/978-3-319-64027-3

Henning, A., & van de Ven, K. (2017). "Counting your steps": The use of wearable technology to promote employees' health and wellbeing. *Performance Enhancement & Health*, *5*(4), 123–124. doi:10.1016/j.peh.2017.11.002

Hsiao, K.-L. (2017). What drives smartwatch adoption intention? Comparing Apple and non-Apple watches. *Library Hi Tech*, *35*(1), 186–206. doi:10.1108/LHT-09-2016-0105

Hwang, C., Chung, T. L., & Sanders, E. A. (2016). Attitudes and Purchase Intentions for Smart Clothing: Examining U.S. Consumers' Functional, Expressive, and Aesthetic Needs for Solar-Powered Clothing. *Clothing & Textiles Research Journal*, *34*(3), 207–222. doi:10.1177/0887302X16646447

Hwang, S., Seo, J. O., Jebelli, H., & Lee, S. H. (2016). Feasibility analysis of heart rate monitoring of construction workers using a photoplethysmography (PPG) sensor embedded in a wristband-type activity tracker. *Automation in Construction*, *71*(Part 2), 372–381. doi:10.1016/j.autcon.2016.08.029

IDC's Worldwide Quarterly Wearable Device Tracker. (2017). IDC. Retrieved from https://www.idc.com/tracker/showproductinfo.jsp?prod_id=962 as on 15/03/2018

Jeong, S. C., Kim, S. H., Park, J. Y., & Choi, B. (2017). Domain-specific innovativeness and new product adoption: A case of wearable devices. *Telematics and Informatics*, *34*(5), 399–412. doi:10.1016/j.tele.2016.09.001

Jiang, Fei and Huang, X. (2017). Development Report on China's Wearable Devices in 2014. In *Development Report on China's New Media* (pp. 129–145). Springer. doi:10.1007/978-981-10-3683-5

Jung, Y., Kim, S., & Choi, B. (2016). Consumer valuation of the wearables: The case of smartwatches. *Computers in Human Behavior*, *63*, 899–905. doi:10.1016/j.chb.2016.06.040

Kaewkannate, K., & Kim, S. (2016). A comparison of wearable fitness devices. *BMC Public Health*, *16*(1), 433. doi:10.1186/s12889-016-3059-0

Kalantari, M. (2017). Consumers' adoption of wearable technologies: Literature review, synthesis, and future research agenda. *International Journal of Technology Marketing*, *12*(3), 274. doi:10.1504/IJTMKT.2017.089665

Kalantari, M., Rauschnabel, P., & Head, Á. M. Á. (2017). Exploring the Early Adopters of Augmented Reality Smart Glasses: The Case of Microsoft HoloLens. In Augmented Reality and Virtual Reality Empowering Human, Place and Business (pp. 229–245). Springer. doi:10.1007/978-3-319-64027-3

Karahanna, E., Straub, D. W., & Chervany, N. L. (1999). Information Technology Adoption Across Time: A Cross-Sectional Comparison of Pre- Adoption and Post-Adoption Beliefs Stable. *MIS Quarterly, 23*(2), 183–213. doi:10.2307/249751

Karamaki, H., Lahtinen, S., & Tuominen, P. (2017). Building a Conceptual Model for Brand Meanings in Wearable Sports Technology. In *Proceedings of the 20th Eurasia Business and Economics Society Conference, Eurasian Business Perspectives* (Vol. 1, pp. 233-243).

Karapanos, E., Gouveia, R., Hassenzahl, M., & Forlizzi, J. (2016). Wellbeing in the Making: Peoples' Experiences with Wearable Activity Trackers. *Psychology of Well-Being*, *6*(1), 4. doi:10.1186/s13612-016-0042-6

Kerner, C., & Goodyear, V. A. (2017). The Motivational Impact of Wearable Healthy Lifestyle Technologies: A Self-determination Perspective on Fitbits With Adolescents. *American Journal of Health Education*, *48*(5), 287–297. doi:10.1080/19325037.2017.1343161

Knight, J. F., & Baber, C. (2005). A Tool to Assess the Comfort of Wearable Computers. *Human Factors: The Journal of the Human Factors and Ergonomics Society*, *47*(1), 77–91. doi:10.1518/0018720053653875

Koo, H. S., & Fallon, K. (2017). Preferences in tracking dimensions for wearable technology. *International Journal of Clothing Science and Technology*, *29*(2), 180–199. doi:10.1108/IJCST-03-2016-0021

Koo, S. H. (2017). Consumer Differences in the United States and India on Wearable Trackers. *Family and Consumer Sciences Research Journal*, *46*(1), 40–56. doi:10.1111/fcsr.12230

Kreitzberg, D. S. C., Dailey, S. L., Vogt, T. M., Robinson, D., & Zhu, Y. (2016). What is your fitness tracker communicating?: Exploring messages and effects of wearable fitness devices. *Qualitative Research Reports in Communication*, *17*(1), 93–101. doi:10.1080/17459435.2016.1220418

Lee, M., Carswell, C. M., Miller-Spillman, K., & Sublette, M. (2015). Clothing & HF/E: A hedonomic and eudaimonic look at the original wearables. *Human Factors: The Journal of the Human Factors and Ergonomics Society, 2015–. Janua*, *981–985*. doi:10.1177/1541931215591282

Lee, S., Sohn, J., Usami, A., & Hamanaka, M. (2010). Development of Wearable Device by Kid's friendly Design for Kid's Safety. *Human-Computer Interaction*, *2010*, 80–85.

Lee, S. Y., & Lee, K. (2018). Factors that influence an individual's intention to adopt a wearable healthcare device: The case of a wearable fitness tracker. *Technological Forecasting and Social Change, 129*(February), 154–163. 10.1016/j.techfore.2018.01.002

Lewis, J. E., & Neider, M. B. (2017). Designing Wearable Technology for an Aging Population. *Ergonomics in Design*, *25*(3), 4–10. doi:10.1177/1064804616645488

Li, H., Wu, J., Gao, Y., & Shi, Y. (2016). Examining individuals' adoption of healthcare wearable devices: An empirical study from privacy calculus perspective. *International Journal of Medical Informatics*, *88*(555), 8–17. doi:10.1016/j.ijmedinf.2015.12.010

LibGuides. (2018). A Guide to Conducting Systematic Reviews: Getting Started. Retrieved from http://guides.library.cornell.edu/c.php?g=459012&p=3142075

Lipman, V. (2014). 71% of 16-to-24-year-olds want wearable tech. Why don't I even want to wear a watch. *Forbes*. Retrieved from http://www.forbes.com/sites/victorlipman/2018/02/16/71-of-16- 24s-want-wearable-tech-why-dont-i-even-want-to-wear-a-watch/

Liu, D., & Guo, X. (2017). Can trust and social benefit really help? Empirical examination of purchase intentions for wearable devices. *Information Development*, *33*(1), 43–56. doi:10.1177/0266666916635724

Lunney, A., Cunningham, N. R., & Eastin, M. S. (2016). Wearable fitness technology: A structural investigation into acceptance and perceived fitness outcomes. *Computers in Human Behavior*, *65*, 114–120. doi:10.1016/j.chb.2016.08.007

Maher, C., Ryan, J., Ambrosi, C., & Edney, S. (2017). Users' experiences of wearable activity trackers: A cross-sectional study. *BMC Public Health*, *17*(1), 1–8. doi:10.1186/s12889-017-4888-1

Mann, S. (1996). Smart clothing: The shift to wearable computing. *Communications of the ACM*, *39*(8), 23–24. doi:10.1145/232014.232021

Mann, S. (2003). Existential Technology: Wearable Computing Is Not the Real Issue! *The MIT PRESS, 36*(1), 19–25.

Marakhimov, A., & Joo, J. (2017). Consumer adaptation and infusion of wearable devices for healthcare. *Computers in Human Behavior*, *76*, 135–148. doi:10.1016/j.chb.2017.07.016

Mercado, P. R. (2018). Adoption of fitness wearables: Insights from Partial Least Squares and Qualitative Comparative Analysis Pável. *Journal of Systems and Information Technology*. doi:10.1108/09574090910954864

Michaelis, J. R., Rupp, M. A., Kozachuk, J., Ho, B., Zapata-Ocampo, D., McConnell, D. S., & Smither, J. A. (2016). Describing the user experience of wearable fitness technology through online product reviews. *Human Factors: The Journal of the Human Factors and Ergonomics Society*, *1072–1076*. doi:10.1177/1541931213601248

Migicovsky, A., Durumeric, Z., Ringenberg, J., & Halderman, J. A. (2014, March). Outsmarting proctors with smartwatches: A case study on wearable computing security. In International Conference on Financial Cryptography and Data Security (pp. 89-96). Springer. doi:10.1007/978-3-662-45472-5_7

Mital, M., Choudhary, P., Chang, V., Papa, A., & Pani, A. K. (2016). Adoption of Internet of Things in India: A test of competing models using a structured equation modeling approach. *Technological Forecasting and Social Change*, 1–8. doi:10.1016/j.techfore.2017.03.001

Moore, G. C., & Benbasat, I. (1991). Development of an instrument to measure the perceptions of adopting an information technology innovation. *Information Systems Research*, *2*(3), 192–222. doi:10.1287/isre.2.3.192

Morabito, V. (2016). The future of digital business innovation: Trends and practices. In *The Future of Digital Business Innovation: Trends and Practices*. doi:10.1007/978-3-319-26874-3

Morris, M. G., Hall, M., Davis, G. B., Davis, F. D., & Walton, S. M. (2003). User acceptance of information technology: Toward a unified view. *Management Information Systems Quarterly*, *27*(3), 425–478. doi:10.2307/30036540

Morris, R. (2015). Wearable Technology. Function, Fit, Fashion, Fun. Retrieved from http://www.onebeacontech.com/OneBeaconTech/pages/news

Motti, V. G., & Caine, K. (2014). Human Factors Considerations in the Design of Wearable Devices. *Human Factors: The Journal of the Human Factors and Ergonomics Society*, *58*(1), 1820–1824. doi:10.1177/1541931214581381

Muaremi, A., Arnrich, B., & Tröster, G. (2013). Towards Measuring Stress with Smartphones and Wearable Devices During Workday and Sleep. *BioNanoScience*, *3*(2), 172–183. doi:10.1007/s12668-013-0089-2

Nasiopoulos, E., Risko, E. F., Foulsham, T., & Kingstone, A. (2015). Wearable computing: Will it make people prosocial? *British Journal of Psychology*, *106*(2), 209–216. doi:10.1111/bjop.12080

Nasir, S., & Yurder, Y. (2015). Consumers' and Physicians' Perceptions about High Tech Wearable Health Products. *Procedia: Social and Behavioral Sciences*, *195*, 1261–1267. doi:10.1016/j.sbspro.2015.06.279

Norman, D. (2013). The Paradox of Wearable Technologies. *Technology Review*.

Page, T. (2015). A Forecast of the Adoption of Wearable Technology. *International Journal of Technology Diffusion*, *6*(2), 12–29. doi:10.4018/IJTD.2015040102

Papi, E., Osei-Kuffour, D., Chen, Y. M. A., & McGregor, A. H. (2015). Use of wearable technology for performance assessment: A validation study. *Medical Engineering & Physics*, *37*(7), 698–704. doi:10.1016/j.medengphy.2015.03.017

Parasuraman, A. (2000). Technology readness index (TRI) a multiple-item scale to embrace new technologies. *Journal of Service Research*, *2*(4), 307–320. doi:10.1177/109467050024001

Park, K., & Koh, J. (2017). Exploring the relationship between perceived pace of technology change and adoption resistance to convergence products. *Computers in Human Behavior*, *69*, 142–150. doi:10.1016/j.chb.2016.12.017

Park, S., Chung, K., &Jayaraman, S. (2014). Wearables: Fundamentals, Advancements, and a Roadmap for the Future. *Wearable Sensors: Fundamentals, Implementation and Applications*. doi:10.1016/B978-0-12-418662-0.00001-5

Piwek, L., Ellis, D. A., Andrews, S., & Joinson, A. (2016). The Rise of Consumer Health Wearables: Promises and Barriers. *PLoS Medicine*, *13*(2), 1–9. doi:10.1371/journal.pmed.1001953

Rauschnabel, P. A., Brem, A., & Ivens, B. S. (2015). Who will buy smart glasses? Empirical results of two pre-market-entry studies on the role of personality in individual awareness and intended adoption of Google Glass wearables. *Computers in Human Behavior*, *49*, 635–647. doi:10.1016/j.chb.2015.03.003

Rauschnabel, P. A., Hein, D. W. E., He, J., Ro, Y. K., Rawashdeh, S., & Krulikowski, B. (2016). Fashion or Technology? A Fashnology Perspective on the Perception and Adoption of Augmented Reality Smart Glasses. *I-Com*, *15*(2). doi:10.1515/icom-2016-0021

Rogers, E. M. (1995). *Diffusion of Innovations. Elements of Diffusion*.

Rupp, M. A., Michaelis, J. R., McConnell, D. S., & Smither, J. A. (2016). The impact of technological trust and self-determined motivation on intentions to use wearable fitness technology. *Human Factors: The Journal of the Human Factors and Ergonomics Society*, *1433–1437*. doi:10.1177/1541931213601329

Samost, A., Perlman, D., Domel, A. G., Reimer, B., Mehler, B., & Mehler, A., … McWilliams, T. (2015). Comparing the relative impact of smartwatch and smartphone use while driving on workload, attention, and driving performance. *Human Factors: The Journal of the Human Factors and Ergonomics Society*, *1602–1606*. doi:10.1177/1541931215591347

Sawyer, B. D., Finomore, V. S., Calvo, A. A., & Hancock, P. A. (2014). Google glass: A driver distraction cause or cure? *Human Factors: The Journal of the Human Factors and Ergonomics Society*, *56*(7), 1307–1321. doi:10.1177/0018720814555723

Schall, M. C., Sesek, R. F., & Cavuoto, L. A. (2018). Barriers to the Adoption of Wearable Sensors in the Workplace: A Survey of Occupational Safety and Health Professionals. *Human Factors: The Journal of the Human Factors and Ergonomics Society*. doi:10.1177/0018720817753907

Summerton, N. (2016). Why wearable tech matters to organisational wellbeing. *Strategic HR Review*, *15*(2), 98–99. doi:10.1108/SHR-12-2015-0098

Tehrani, K., & Michael, A. (2014). Wearable Technology and Wearable Devices: Everything You Need to Know. *Wearable Devices*. Retrieved from http://www.wearabledevices.com/what-is-a-wearable-device/

Thierer, A. D. (2015). The internet of things and wearable technology: Addressing privacy and security concerns without derailing innovation. *Richmond Journal of Law and Technology*, *XXI*(2), 1–118.

Turhan, G. (2013). An assessment towards the acceptance of wearable technology to consumers in Turkey: The application to smart bra and t-shirt products. *Journal of the Textile Institute*, *104*(4), 375–395. doi:10.1080/00405000.2012.736191

Turner, M., Kitchenham, B., Brereton, P., Charters, S., & Budgen, D. (2010). Does the technology acceptance model predict actual use? A systematic literature review. *Information and Software Technology*, *52*(5), 463–479. doi:10.1016/j.infsof.2009.11.005

Venkatesh, V., Davis, F. D., Venkatesh, V., & Davis, F. D. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science, INFORMS*, *46*(2), 186–204. doi:10.1287/mnsc.46.2.186.11926

Venkatesh, V., Thong, J., & Xu, X. (2012). Consumer acceptance and user of information technology: Extending the unified theory of acceptance and use of technology. *Management Information Systems Quarterly*, *36*(1), 157–178. doi:10.2307/41410412

Vichitvanichphong, S., Kerr, D., Talaei-Khoei, A., & Ghapanchi, A. H. (2014). Assistive technologies for aged care: Supportive or empowering? *AJIS. Australasian Journal of Information Systems*, *18*(3), 75–96. doi:10.3127/ajis.v18i3.880

Wright, R., & Keith, L. (2014). Wearable technology: If the tech fits, wear it. *Journal of Electronic Resources in Medical Libraries*, *11*(4), 204–216. doi:10.1080/15424065.2014.969051

Wu, L., Fan, A. A., & Mattila, A. S. (2015). Wearable technology in service delivery processes: The gender-moderated technology objectification effect. *International Journal of Hospitality Management*, *51*, 1–7. doi:10.1016/j.ijhm.2015.08.010

Wu, L. H., Wu, L. C., & Chang, S. C. (2016). Exploring consumers' intention to accept smartwatch. *Computers in Human Behavior*, *64*, 383–392. doi:10.1016/j.chb.2016.07.005

Zhang, M., Luo, M., Nie, R., & Zhang, Y. (2017). Technical attributes, health attribute, consumer attributes and their roles in adoption intention of healthcare wearable technology. *International Journal of Medical Informatics*, *108*(August), 97–109. doi:10.1016/j.ijmedinf.2017.09.016

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