The risks and benefits of Internet of Things (IoT) and their influence on smartwatch use

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Abstract

Purpose – This study aims to determine how Internet of Things (IoT) risks and benefits affect both the intention to use and actual use of a smartwatch.

Methodology – The stimulus–organism–behavior–consequence (SOBC) hypothesis is used to explain the mechanisms underpinning the discontinuity between intention and technology usage. A total of 394 questionnaires distributed to smartwatch users were analyzed, using convergent analysis, discriminant analysis and structural modeling.

Findings – The IoT's technical features, such as continuous connectivity and real-time value, serve as effective stimuli for smartwatches, positively influencing individuals' responses and behavioral consequences associated with smartwatch usage. While IoT risks such as data, performance and financial have no negative relationship with the usefulness of smartwatches, data and financial risks have a negative influence on their ease of use. Additionally, as ease of use and usefulness have a positive impact on intention to use, users' behavior is positively influenced by their intentions to use a smartwatch.

Value – The study applies technology acceptance theory and the SOBC paradigm to smartwatches to determine if users' intentions to use them impact their behavior. Furthermore, the research analyzed the technical elements of smartwatches in terms of IoT advantages and risks.

Keywords Internet of Things, SOBC, Risks, Benefits, Smartwatch use

Paper type Research paper

Los riesgos y beneficios del internet de las cosas (IoT) y su influencia en el uso de smartwatches

Resumen

Propósito – El objetivo del presente estudio es determinar cómo los riesgos y beneficios del Internet de las Cosas afectan tanto a la intención de uso como al uso real de un smartwatch.

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Metodología – Se utiliza el modelo Estímulo-Organismo-Comportamiento-Consecuencia (SOBC) para explicar los mecanismos que sustentan la discontinuidad entre la intención y el uso de la tecnología. Se analizaron 394 cuestionarios distribuidos a usuarios de smartwatches, empleando análisis convergente, análisis discriminante y modelización estructural.

Resultados – Las características técnicas del IoT, como la conectividad continua y el valor en tiempo real, sirven como estímulos efectivos para los smartwatches, influyendo positivamente en las respuestas de los individuos y en las consecuencias conductuales asociadas al uso del smartwatch. Mientras que los riesgos de la IO, como los datos, el rendimiento y los financieros, no tienen una relación negativa con la utilidad de los smartwatches, los riesgos de los datos y los financieros influyen negativamente en su facilidad de uso. Además, dado que la facilidad de uso y la utilidad tienen un impacto positivo en la intención de uso, el comportamiento de los usuarios está positivamente influenciado por sus intenciones de usar un smartwatch.

Originalidad – El estudio aplica la teoría de la aceptación de la tecnología y el paradigma SOBC a los smartwatches para determinar si las intenciones de uso de los usuarios influyen en su comportamiento. Además, la investigación analiza los elementos técnicos de los smartwatches en cuanto a las ventajas y los riesgos del IoT.

Palabras clave: – Internet de las cosas, SOBC, riesgos, beneficios, uso de smartwatches

Tipo de articulo – Trabajo de investigación

物联网（IoT）的风险和好处及其对智能手表使用的影响

摘要

目的 – 本研究的目的是确定物联网的风险和利益如何影响智能手表的使用意向和实际使用。

方法。 – 刺激-组织-行为-后果（SOBC）假说被用来解释意图和技术使用之间不连续的基础机制。对发放给智能手表用户的394份调查问卷进行了分析, 采用了收敛分析、判别分析和结构模型法。

研究结果。 – 物联网的技术特点, 如持续连接和实时价值, 作为智能手表的有效刺激, 对个人的反应和与智能手表使用相关的行为后果产生积极影响。虽然数据、性能和财务等物联网风险与智能手表的有用性没有消极关系, 但数据和财务风险对其易用性有消极影响。此外, 由于易用性和有用性对使用意图有积极影响, 用户的行为受到他们使用智能手表的意图的积极影响。

原创性。 – 该研究将技术接受理论和SOBC范式应用于智能手表, 以确定用户的使用意图是否影响其行为。此外, 该研究还从物联网的优势和风险方面分析了智能手表的技术要素。

关键词。 – 物联网, SOBC, 风险, 好处,智能手表使用。

1. Introduction

Personal health monitoring in the billion-dollar worldwide smartwatch sector has progressed to a new level. They are wrist-worn computers with a wide range of sensors. Heart rate, motion tracking, physical activity and physiological signals, such as photoplethysmography (PPG) and electrocardiography (ECG), may all be measured by smartwatches, as well as specific physiological indicators that are extracted from PPG and ECG. Smartwatches can continually monitor a patient's physical status and transmit physiological data to third-party stakeholders, such as physicians and hospital employees. Additionally, they may provide users with real-time physiological data and customized notifications (Saheb, 2018; Saheb and Izadi, 2019a; Saheb and Saheb, 2021).

Identifying the characteristics that facilitate wearable adoption has been one of the study's foci. As a consequence, the majority of earlier research on wearables intention and usage was based on acceptable theories in social psychology or technology. The majority of studies, on the other hand, merely investigated whether individuals intended to use wearables. Therefore, it is imperative for academics to investigate the impact of various variables on actual wearables usage. Likewise, prior research has focused on smartwatches as fashion and health-care products rather than information technology (IT) solutions. These studies focus on user-related factors such as emotions, fashion preferences and innovativeness. Other research examines the functioning of smartwatches, focusing on their use in self-health-care management. As a consequence, little is known about the impact of smartwatches' technical characteristics as IT products on their actual usage. From another perspective, health informatics devices that create large amounts of data pose ethical concerns, such as security and data privacy.

This work offers three significant theoretical contributions to the area of consumer behavior research and the technology adoption model. First, the present research will integrate the technology acceptance model (TAM) and the stimulus–organism–behavior–consequence (SOBC) paradigm in the context of smartwatches to understand the intention-use gap associated with smartwatches. In this research, the SOBC paradigm is combined with the TAM to gain insights into customer behavior and technological acceptability. According to TAM theory, a variety of external variables has an effect on both the intention to use and actual behavioral use of technology. In this research, the SOBC theory is incorporated to examine external stimuli, such as risks and benefits, as well as internal processes, such as attitudes, emotions and intentions and their effect on the outcomes, which is user behavior. Second, the technical characteristics of smartwatches as IT products are assessed. There has been minimal attention focused on comprehending the technology use of smartwatches, with a particular emphasis on its technical features. Two critical characteristics of smartwatches that are evaluated in this research are connectivity and real-time physiological data. Several researchers have previously stressed the critical nature of instantaneous connectivity in IoT-based systems (Chai *et al.*, 2014). Furthermore, as proved by earlier research, one of the key advantages of an IoT device is its capacity to collect real-time physiological data from users (Saheb and Izadi, 2019). While prior research has primarily concentrated on smartwatches as fashion, enjoyment and innovation tools, examining the influence of smartwatch technological improvements on user intention and behavior merits more scholarly attention. Third, this research examines the risks associated with using a smartwatch in addition to the benefits of an external stimulus. These risks and benefits are a result of the technical capabilities of smartwatches. While a growing body of research on technology adoption has studied the effect of risks on adoption, the link between risks and smartwatches deserves more academic attention.

This research investigates data from 394 international wearables users, with the main objective of determining the benefits and risks of wearables, as well as the effect of intention to use on actual wearable usage. Our work contributes to the body of knowledge on the TAM by incorporating the SOBC theory, a novel paradigm for smartwatch adoption research. This is the first research to use SOBC to identify the external factors that influence smartwatch intention and use. Second, this study's analysis was not restricted to intentions or attitudes. The study expands previous research by analyzing the relationships between intention to use and actual use behavior. The goal of this study is to explore the intention-to-use gap in smartwatch usage. While users may express favorable intentions and a willingness to embrace technology, their actual use and purchasing behavior may differ (Talwar *et al.*, 2021). The existing intention-behavior gap in the usage of wearables motivated the present investigation to identify the gap. The primary objective is to extend the TAM model by examining the factors that influence wearables' use globally and by examining the hitherto unstudied intention-use gap for wearables. This study addresses three major research questions:

RQ1. What variables are positively connected with the intention of using a smartwatch?

RQ2. What variables have a negative correlation with the intention of using a smartwatch?

RQ3. What relationship exists between claimed smartwatch use behavior and the intention to use?

The following sections outline the research methodology. In Section 2, the theoretical background and research hypotheses are described. Following that, in Section 3, the methodology is discussed before delving into the study's results given in Section 4. The article finishes with a discussion of the theoretical and managerial implications, as well as the paper's limitations and possible future study approaches, in Section 5.

2. Theoretical framework and hypothesis development

The purpose of this research is to determine the parameters that impact both the intention to adopt and the actual usage of smartwatches. The SOBC framework is applied to support the research in accomplishing this objective.

2.1 Adoption of smartwatches

One of the academic concerns is the widespread adoption of smartwatches. Various studies have been conducted to examine the influence of different variables on smartwatch adoption. The majority of prior research has incorporated theories such as the technology acceptance model, the innovation diffusion theory, the theory of planned behavior and others from social psychology. One of the major impediments to smartwatch adoption is determining if the device is an IT device, a fashion accessory or an innovative tool that depicts the user as fashionable or innovative. Prior study has referred to smartwatches as "fashionology," with a focus on its aesthetic and fashion attributes (Chuah *et al.*, 2016; Blazquez *et al.*, 2020). Another approach is to look at smartwatches' novel features to observe whether they have an impact on the adoption of wearable technology (Li *et al.*, 2016a; Saheb, 2020a). Smartwatches may even be regarded as a kind of entertainment by certain researchers (Herweijer *et al.*, 2018). Others call smartwatches "healthology" and investigate the health concerns that underlie their adoption (Dehghani, 2018).

Similarly, although risks have been widely addressed in the literature on technological adoption, relatively few studies on wearable adoption have examined the influence of risk factors on their adoption, especially risks associated with personal physiological data gathered by smartwatches. As a consequence of smartwatch data concerns, researchers (Kang and Jung, 2020) examine the formation of a "smart wearables-privacy paradox."

In contrast to past research, this research concentrates on smartwatches as an IT product to comprehend how their technological features stimulate or impede demand for smartwatches. An increasing concern in the literature on smartwatch adoption is data risk, which is also being addressed by this research. Although prior studies have used social psychology or technology acceptance theories, this research incorporates the SOBC theory, which is part of the behavioral psychology literature.

2.2 Stimulus–organism–behavior–consequence

Previously, the SOBC theory was used to examine the relationship between stimuli (inputs), processes (organisms), output (response) and consequences. It is a development of the stimulus–organization–response theory (Mehrabian and Russell, 1974), which describes the complex interactions between an individual and their environment. This theory explores the correlation between external stimuli and internal psychological processes such as attitudes, emotions and intentions. Additionally, it states that organisms or their internal states have an impact on individuals' behavioral responses (B), which has an effect on the consequences (C). In addition to altering an individual's perception of their environment, this process has a direct impact on their internal moods (Talwar *et al.*, 2021).

The SOBC model's stimulus refers to both explicit and implicit stimuli in the environment. The cognitive processes of an individual interacting with their surroundings and their behavior are known as organisms. The consequence factor relates to the possible reinforcing or punishing repercussions of a behavioral pattern, whereas behavior relates to the behavioral pattern (Davis and Luthans, 1980). The SOBC model incorporates the reciprocal and interacting nature of environmental occurrences (S and C variables) with cognitive and behavioral components (O and B variables).

This SOBC framework was incorporated to augment the TAM by elucidating the process underlying the discrepancy between intention and usage. For illustration, an individual may have negative perceptions about technology's financial risks but continue to acquire and use devices. As a result, this theory can be used to explain the intention-use gap in the adoption of wearables. The SOBC theory, which asserts that consumers' internal feelings and subsequent actions are socially determined, can also account for the general population's acceptance of smartwatches and other fitness wearables as a result of a societal tendency toward self-care (Whelan *et al.*, 2020).

2.3 Stimulus

In this study, the benefits and risks of IoT are used to reflect consumers' internal or organismic states (O). These organismic states have behavioral repercussions that are referred to as use behavior.

2.3.1 Internet of Things benefits. One of the most pressing research questions surrounding technology adoption is whether or not technical benefits impact adoption decisions. Smartwatches have previously been largely studied in terms of specific values collected from these devices (Hong *et al.*, 2017). However, there seems to be little study undertaken on the technological advantages of smartwatches, notably those advantages derived from IoT technical characteristics. Continuous connectivity and real-time data are two major variables in this study, which both exhibit the IoT's technical advantages. The importance of connectivity has been a crucial factor in technology adoption. Prior research, on the other hand, has concentrated exclusively on the impact of connectivity on e-commerce and has largely ignored the impact of connectivity on IoT-enabled products such as smartwatches. To address this gap in the research, our study focuses on the continuous connectivity of smartwatches. There have been relatively few studies that examine perceived connection. For example, in their research, Baudier *et al.* (2020) discovered that perceived connectivity has direct impact on the adoption of smartwatches. Continuous connectivity implies wireless connectivity for time convenience, wide-band data channel availability and mobility in monitoring health status at any time and in any place. In addition, fog computing is one of the primary characteristics of IoT devices (Saheb, 2018). This characteristic has also been overlooked in the prior studies. Perceived real-time implies the value of data as perceived by the users when they receive physiological and customized data via their smartwatch. The purpose of this study is to determine if these two key technical benefits of smartwatches have an effect on the perceived usefulness and ease of use.

Therefore, the following research hypotheses are proposed:

H1. Perceived usefulness is positively associated with continuous connectivity.

H2. Real-time value has a positive relationship with perceived usefulness.

H3. Perceived ease of use is positively associated with continuous connectivity.

H4. Perceived ease of use is positively connected to real-time value.

2.3.2 Internet of Things risks. One of the fundamental academic concerns is whether certain types of risks discourage consumers from adopting technology. Various types of risks have been discovered and assessed in preceding studies. This study identifies three distinct categories of risk associated with smartwatches: data risk, performance risk and financial risk. Data risk occurs when personal information about smartwatch users is disclosed. The term "performance risks" refers to concerns linked with a smartwatch's poor performance. As a result, performance risk is defined as a smartwatch's inability to achieve the desired results. Financial risk relates to the cost of adopting a smartwatch, whereas privacy risk is concerned with users' loss of control over their personal data. Financial risk is defined as the financial constraints imposed by a smartwatch, for example, the device's high price.

Risk is one of the most contentious academic factors in the adoption literature. However, the results of research on the influence of risks on smartwatch adoption differ, with the majority indicating that risks have a negative effect on adoption. This discrepancy motivated us to evaluate the three aforementioned risks in our research to determine whether they entail a negative effect on adoption and so restrict smartwatch usage.

Previous research has reported that data protection risks are intrinsic to digital health technologies and are a major bottleneck in their adoption (Saheb and Saheb, 2021; Saheb *et al.*, 2021). Featherman and Pavlou (2003) identified a number of risk factors that contribute to the reduction of intentional behavior (i.e. performance, financial, time, psychological, social, privacy and physical). Saheb (2020) contends that data risks are associated with smart watch adoption. According to a prior study, financial risk might dissuade an individual from adopting a technology (Yang *et al.*, 2016). Perceived privacy risk has been identified as a significant factor (Gao *et al.*, 2015), as has perceived performance risk (Hwang *et al.*, 2016). Prior research revealed that the sensitive nature of health information may elicit concerns about the concerns linked to personal data disclosures (Li *et al.*, 2016) in addition to perceived risk (Kamal *et al.*, 2020).

As a consequence of these observations, the following research hypotheses have been developed:

H5. Perceived usefulness and data risk are negatively connected.

H6. Perceived usefulness and performance risk are negatively correlated.

H7. Financial risk has a negative effect on perceived usefulness.

H8. Perceived ease of use is negatively associated with data risk.

H9. Perceived ease of use has a negative connection on performance risk.

H10. Financial risk has a negative relationship with perceived ease of use.

2.4 Organism and response

Wearables are defined here in terms of the internal emotions generated by customers' perceptions of the risks and benefits of the Internet of Things (IoT).

2.4.1 Perceived usefulness and ease of use. According to the technology acceptance research (Venkatesh *et al.*, 2003), information about a person's perceived usefulness, ease of use and future behavioral intentions can be used to predict whether or not they will embrace a particular technology. When technology aids in the enhancement of an individual's performance, it is deemed advantageous. The term "ease of use" refers to the fact that the technology does not require further effort to be used.

The phrases "usefulness" and "ease of use" are widely used terms in studies on wearable adoption. Almost all of prior studies demonstrate a direct relationship between usefulness and ease of use (Liébana-Cabanillas *et al.*, 2014). The results of research on the direct and indirect relationships between ease of use and usage behavior have been conflicting. Certain studies identified a direct link between them, while others established an indirect or peripheral connection (Davis, 1993; Venkatesh, 2000). Smartwatches' adoption intentions may be influenced by their perceived usefulness, according to some research (Chuah *et al.*, 2016; Hong *et al.*, 2017). According to certain research, the ease of using a smartwatch has no discernible and direct effect on consumers' intentions to use them (Wu *et al.*, 2016).

As a consequence, the following hypotheses have been developed:

H11. Perceived usefulness has a positive relationship with the intention to use.

H12. Perceived ease of use is positively associated with the intention to use.

2.5 Response and consequence

Smartwatches play a critical role in how individuals manage their self-care on a daily basis. Individuals' willingness to use a smartwatch to enhance their self-care management is called usage intention (Saheb, 2020). According to Ajzen (1991), individual intent is the primary motivator of behavior and the most reliable predictor of actual usage. In this context, research on IT has emphasized and evaluated the significance of intention to use as a predictor of behavior (Venkatesh and Davis, 2000). Further academic investigation is required to determine the effect of the intention to use wearables. The majority of earlier research on IT uses asserts that behavioral intentions are the primary predictor of use behavior. However, research indicates a weak-to-moderate relationship between these two variables, spawning the intention–behavior gap theory (Birch and Memery, 2020).

Therefore, the following hypothesis is advanced:

H13. Intention to use is positively associated with use behavior. Figure 1 depicts the model used in this research.

3. Research method

3.1 Data collection

To gather data, a questionnaire was designed on the Iranian website CafePardazesh.com and distributed to everyone who has worn a smartwatch. A randomized society was selected for the sample. Additionally, members of the sample connected us with other smartwatch users. The authors contacted members of the sample society and shared the questionnaire link on social media sites such as Instagram, Telegram and LinkedIn. The

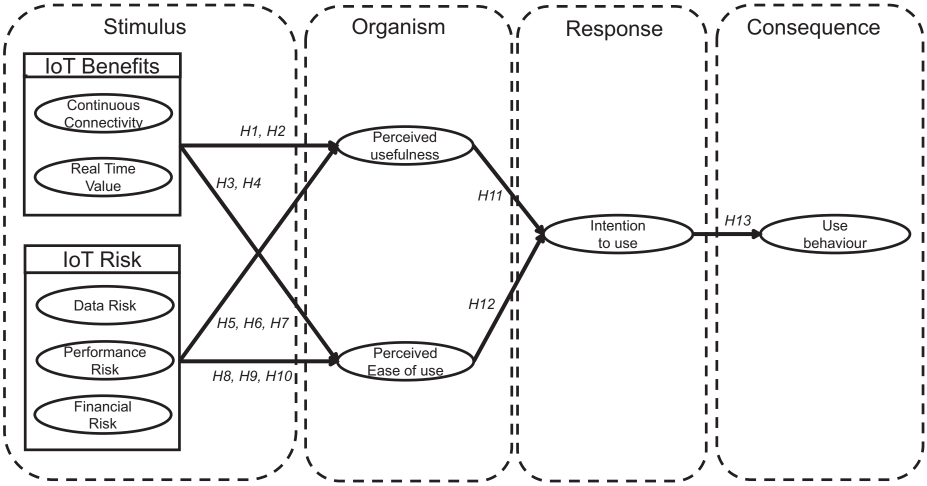


Figure 1.
Theoretical model of the study

questionnaire was delivered to 500 individuals of various nationalities, ages, genders and occupations (e.g. students, athletes, faculty members and housekeepers) who indicated that they have used a smartwatch. There were 400 questionnaires returned. After filtering out questionable replies, 394 surveys remained. Table 1 summarizes the demographic characteristics of the sample group. The objective was to compile a representative sample of smartwatch users.

3.2 Measures

The questionnaire was comprised of 26 items assessing the nine constructs and was based on a questionnaire originally used to assess technology adoption. The continuous connectivity was assessed using items adapted from Chung and Lee (2011) and Hubert *et al.* (2017). Items pertaining to the data's real-time value were gathered from Bauer *et al.* (2005), Lee and Jun (2007) and Hubert *et al.* (2017). Items pertaining to performance, financial and

Variable	Cases (%)
Gender	
Men	170 (43.1)
Women	224 (56.9)
Age	
Under 20	32 (8.1)
Between 20 and 29	199 (50.5)
Between 30 and 40	125 (31.7)
Over 40	38 (9.6)
Last time smartwatch use	
1–7 days ago	266 (67.5)
2–4 weeks ago	46 (11.7)
1–2 Months ago	22 (5.6)
3 months	8 (2)
>3 months ago	52 (13.2)

Table 1.
Descriptive statistics of sample

privacy risk were derived from Gao *et al.* (2015), Kim and Shin (2015); Nasir and Yurder (2015), Hubert *et al.* (2017). Items related to perceived usefulness, perceived ease of use, intention to use and behavior were extracted from Venkatesh *et al.* (2003), Chuah *et al.* (2016); Wu *et al.* (2016). The specifics of measurement scales are listed in Table 2.

SPSS statistical software was used to analyze the responses and structural equation modeling using partial least squares (PLS-SEM) was applied. This is a causal-predictive technique that may be used to predict statistical models with intended causal explanatory structures (Sarstedt *et al.*, 2017). PLS is a statistical technique that can be used for a variety of types of research, including confirmatory research. In this instance, the analysis is conducted using the goodness-of-fit principle (Henseler *et al.*, 2014). Additionally, it leverages a nonparametric approach called bootstrapping, which can be incorporated with other SEM techniques.

4. Results

The data was analysed using convergent analysis, discriminant analysis and structural modeling. Before delving into all of the above, it is important to evaluate common method bias (CMB). Harman's single factor has been examined for this purpose, in which all items are loaded into a single common factor. Whenever the total variance for a single factor is less than 50%, CMB has no influence on the data. The results reveal that in this example, the variables can explain 35.246% of the variance. As a result, it is possible to assert that there is no CMB. Cronbach's alpha coefficient (critical acceptance value = 0.7), composite reliability (CR; threshold value = 0.7) and index of average variance extracted (AVE; threshold value = 0.5 (Fornell and Larcker, 1981) were used to assess convergent validity. Following that, discriminant validity was assessed using the Fornell–Larcker criterion and the HTMT ratio (Henseler *et al.*, 2014). Then, to test the suggested model's hypotheses, we used a SEM technique with SmartPLS software.

4.1 Convergent analysis

Cronbach's alpha and CR both exceed the recommended level, confirming the internal consistency of the outer models (Table 2). We calculated the index of average variance extracted to assess the convergent validity of constructs at the level of the latent variable. Table 2 illustrates that the AVE values were greater than the recommended level of 0.5. As a result, all of the model's latent variables were statistically valid, and the convergent validity of all constructs was validated.

As a rule of thumb, factor loadings should be 0.50 or higher, preferably 0.70 or higher. All factor loadings in this case were more than 0.70. They were also substantial (Carmines and Zeller, 1979), confirming both reliability and convergent validity.

4.2 Discriminant analysis

Finally, we validated the discriminant validity of the measurement model. We calculated a matrix of component correlations. The square roots of the AVE surpassed the construct's relationships with the other components, as shown in Table 3 (Fornell and Larcker, 1981). Moreover, the heterotrait–monotrait ratio was less than 0.9 (a measure of the correlations between pairs of constructs) (Henseler *et al.*, 2014). Discriminant validity has been established as a result.

Constructs and measured items	Loadings
Continuous connectivity (α = 0.89; CR = 0.91; AVE = 0.60)	
Monitoring one's health using a smart watch is an efficient way to keep track of one's health	0.779
I consider it convenient to check my health with the assistance of a smartwatch	0.771
I can save time by utilizing a smartwatch to check my health	0.726
My smartwatch's personalized health information is beneficial for proactive health management	0.796
Personalized alerts on my smart watch may assist me in avoiding sickness	0.772
My smart watch's GPS data (e.g. running miles) enables me to improve my performance for better self-care management	0.745
Personalized alert information based on my past and current health status enables me to control my health effectively	0.807
Real-time value (α = 0.78; CR = 0.86; AVE = 0.60)	
My smartwatch enables real-time monitoring of my health	0.78
My smart watch provides real-time and accurate health data	0.786
My smartwatch enables me to easily obtain physiological data about my body	0.769
Accessing data from a smartwatch does not need a significant deal of mental effort	0.767
Data risk (α = 0.90; CR = 0.94; AVE = 0.83)	
I'm hesitant to use a smartwatch due to potential data security threats	0.902
I avoid wearing a smartwatch out of fear of being observed	0.930
I'm afraid that third parties will be able to track me using data from my smartwatch	0.908
Performance risk (α = 0.82; CR = 0.91; AVE = 0.84)	
Following my smart watch experience, I became skeptical about the smartwatch's ability to perform as intended	0.861
After my smartwatch experience, I became concerned about the smart watch's reliability in terms of benefits	0.966
Financial risk (α = 0.86; CR = 0.92; AVE = 0.78)	
Due to the possibility of increased maintenance and repair costs, using a smartwatch puts my finances at risk	0.851
Purchasing and using a smart watch is a risk due to the potential costs	0.911
I'm afraid that the benefits of a smartwatch may not outweigh the possible risks associated with purchasing one	0.893
Perceived usefulness (α = 0.80; CR = 0.91; AVE = 0.84)	
Monitoring my health using a smartwatch improves my health monitoring performance	0.915
Using a smartwatch to check my health improves my efficiency in monitoring tasks	0.913
Perceived ease of use (α = 0.85; CR = 0.91; AVE = 0.77)	
It's not difficult for me to figure out how to use a smart watch	0.856
It's simple to use a smartwatch for activities I enjoy	0.894
It's easy to monitor my health using a smartwatch	0.875
Intention to use (α = 1.00; CR = 1.00; AVE = 1.00)	
Kindly evaluate your future intention to use your smart watch to track your health	1.00
Behavior (α = 1.00; CR = 1.00; AVE = 1.00)	
In compared to other health monitoring tools, how frequently do you use your smartwatch to check your health?	1.00

Table 2. Standard loadings, composite reliability and average variance extracted

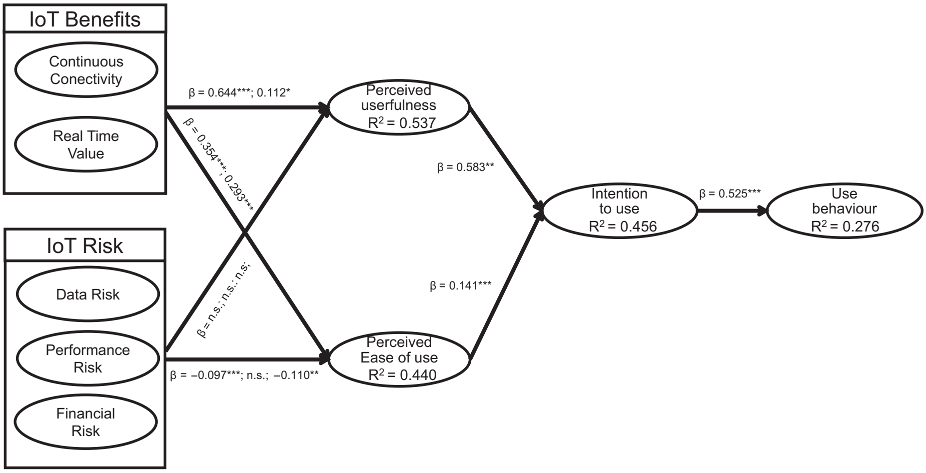
4.3 Structural modeling

A structural model analysis was conducted. A comparative examination of structural coefficients was used to test the research hypotheses. After conducting a bootstrapping analysis, it was concluded that nine of the thirteen hypotheses could be accepted (Figure 2).

Discriminant validity of constructs	1	2	3	4	5	6	7	8	9
1. Behavior	*1.000*	0.514	0.134	0.098	0.525	0.373	0.538	0.126	0.442
2. CC	0.485	*0.771*	0.301	0.135	0.671	0.683	0.860	0.098	0.860
3. DR	−0.126	−0.271	*0.913*	0.559	0.217	0.380	0.262	0.241	0.345
4. FR	−0.097	−0.097	0.496	*0.885*	0.127	0.272	0.128	0.229	0.185
5. Intention	0.525	0.633	−0.205	−0.127	*1.000*	0.519	0.743	0.129	0.566
6. EU	0.347	0.599	−0.328	−0.232	0.483	*0.875*	0.702	0.093	0.717
7. Useful	0.482	0.726	−0.223	−0.115	0.665	0.587	*0.914*	0.045	0.731
8. PR	−0.111	−0.086	0.214	0.215	−0.126	−0.080	−0.039	*0.915*	0.109
9. PRTV	0.390	0.716	−0.290	−0.150	0.499	0.589	0.577	−0.089	*0.776*

Notes: The diagonal elements (in italics) are the square roots of the AVE. Values below the diagonal elements are the inter-construct correlations (Fornell and Larcker's test). Values above the diagonal indicate the HTMT ratio. CC = Continuous connectivity; DR = data risk; FR = financial risk; EU = perceived ease of use; PR = performance risk; PRTV = personalized real time value

Table 3. Discriminant validity



Notes: n.s. = non significance; *$p < 0.1$; **$p < 0.05$; ***$p < 0.001$

Figure 2. Results of the theoretical model of the study

To commence, *H1* (= 0.644; p = 0.000) and *H2* (= 0.112; p = 0.057) are confirmed, but *H2* is only quasi-significant at the 90% level of confidence. Simultaneously, real-time value has a positive impact on perceived usefulness (*H3*, = 0.072; p = 0.000) and perceived ease of use (*H4*, = 0.293; p = 0.000). None of the risk variables (*H5* = −0.022; p = 0.956, *H6* = 0.036; p = 0.398, *H7* = −0.043; p = 0.279) had a statistically significant effect on perceived usefulness. However, perceived ease of use is negatively impacted by data risk (*H8*=−0.097; p = 0.000) and financial risk (*H10* = −0.110; p = 0.024). Finally, perceived usefulness (*H12* = 0.583; p = 0.000) and perceived ease of use (*H11* = 0.131; p = .008) both influence intention to use positively. Thus, intention to use has a direct effect on behavior (*H13* = 0.525; p = .000). Figure 2 illustrates these findings graphically.

For perceived ease of use, the squared multiple correlation coefficient (R^2) is 0.440; for perceived usefulness, it is 0.537; for intention to use, it is 0.456; and for behavior, it is 0.276.

This measure is used to test the extent to which the independent variables explain the dependent variable. The results are favorable since the data are well-fitting. Perceived usefulness (53.7%) had the greatest explanatory power in the model, followed by intention to use (45.6%) and perceived ease of use (44 %). The standardized root mean square residual value was used to test for the difference between observed and anticipated correlations as a measure of model fit. The value returned by the model is 0.059, which is acceptable because it is less than 0.08. Finally, Stone-Geissers was used to determine the model's predictive relevance (Q2). Due to the fact that all values are larger than zero, the model is highly predictive. The main data are summarized in Figure 2.

5. Conclusions and discussion

5.1 Theoretical contributions

The purpose of this study is to ascertain the extent to which technological characteristics of smartwatches influence both their intended and actual use. Unlike past studies, which focused mostly on individual preferences for wearables, this study examined both the risks and benefits of smartwatches. It focuses on two of smartwatches' most major technical benefits: connectivity and real-time data. Second, it underscores the risks associated with smartwatches, such as data risks. In contrast to previous studies on technology adoption, this study incorporates the SOBC paradigm. Third, this study concentrates on smartwatches' real use to get a deeper understanding of the relationship between smartwatches' technical features as an IT product and the gap between intention and actual use of smartwatches. This study addresses a gap in the literature on smartwatch adoption by constructing a theory-based and empirically-validated model to better characterize users' actual behavior.

This study concludes that technical advantages of smartwatches are positively connected with smartwatch adoption. This demonstrates that, in addition to the social and psychological characteristics of individual users, such as their inclination for fashion and innovation, the technological characteristics of smartwatches have an effect on demand for this technology. This study concentrated on two critical technical features; hence, future research can concentrate on other technical and functional aspects of wearable solutions and their influence on adoption behavior.

Risk is an issue that has been widely examined in the adoption literature. Our study concentrates on three sorts of risks: financial, performance and data. The creation of physiological data by wearables has introduced a new set of data privacy concerns. Previous studies attempted to estimate how privacy concerns linked with wearables have exacerbated patients' privacy concerns in hospitals and other public venues where third parties are involved. Our findings in this study prove the presence of a negative correlation between all three risks associated with the IoT (financial, performance and data). This indicates that there is a positive correlation between all three risks and the usefulness of wearables, which affects user intentions to use and behavior when using them. In this era of digital transformation, when data privacy and protection are more crucial than before, it is critical that further study be conducted to explore the relationships between data privacy and wearables' use. The current study indicates positive associations between ease of use and usefulness, as well as between intention to use and behavior, in terms of organism and response. According to the study, perceived usefulness grows when consumers realize it is easy to use a smartwatch.

Furthermore, additional research may be conducted to determine the effect of user experience/user interface on technology adoption to determine whether a smartwatch's user-friendly design boosts its usage. Additionally, this study establishes a link between the intention to use a smartwatch and usage behavior; in other words, intention leads to purchase activity. Finally, the study examines not just the individuals' motivations for using, but also their actual behavior. With the advancement of smartwatches, which entails a smartwatch with increasing technological capabilities, it is also vital to measure the factors that impact the continuing usage of a smartwatch. For instance, why would a user discontinue using a smartwatch, and why would a user upgrade their present system and pay extra to continue using smartwatches?

5.2 Managerial implications

This study reveals that the technological characteristics of a smartwatch have an effect on its consumer usage. This suggests that developer communities should be more conscientious about translating customer expectations and preferences into beneficial technological features that make a smartwatch not only functional but also simple to use. Connectivity and real-time access to physiological data, the study finds, have a favorable impact on smartwatch usage. Smartwatch developers and designers may leverage these two technological characteristics of an IoT device to add additional features, such as presenting more information about human body physiology.

Additionally, this research proposes a positive relationship between risk and smartwatch use. Developers and designers are encouraged to provide users more control over their data in order to increase user confidence and mitigate data risk. Additionally, more inexpensive and functional smartwatches should be manufactured to enable low-income clients to purchase high-quality smartwatches. Additionally, this study recommends that manufacturers of smartwatches supply extra functions for the devices in order to boost demand.

5.3 Limitations of the study

One of the study's key limitations is that it studies just two technical aspects of smartwatches. As a result, extra research should be conducted to evaluate additional technological characteristics of a smartwatch. Prior study has concentrated on smartwatches as a fashion accessory or a health tool. Future study should place a greater emphasis on smartwatches as an IT product in order to better understand the technical determinants that affect its adoption. Another limitation of this study is that it does not assess smartwatch users' perceptions of security and trust, as well as several other risk factors. This paper is concerned primarily with data, performance, and financial risk. Additional study can be undertaken in the future to gain a better understanding of the ethical implications of smartwatches. The third limitation of our study is that it applies the SOBC theory to smartwatch adoption for the first time. We recommend that more research incorporates this theory into their technology adoption studies, rather than focusing exclusively on intentions, and instead analyzes actual user usage and behavior. Additional study might be conducted to examine use continuity and the factors that discourage or encourage users to continue using smartwatches in particular. Likewise, more studies can analyze the existence of mediating factors. Finally, because one-item measures may be problematic, future research should adopt a multiple-item measure for these parameters in order to replicate and corroborate the findings.

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