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Tecnologias Vestíveis no Turismo: Status da Pesquisa e Oportunidades Futuras.

Wearable Technologies in Tourism: Research Status and Future Opportunities.

Bruna Fernandes Guebel, Universidade Federal Fluminense, Brasil
brunaguebel@id.uff.br

Mariana Brandão Cavalheiro, Universidade Federal Fluminense, Brasil
mariana_brandao@id.uff.br

Verônica Feder Mayer, Universidade Federal Fluminense, Brasil
veronicamayer@id.uff.br

RESUMO

A tecnologia de informação e comunicação (TIC) vem desempenhando um papel fundamental na atividade turística. Nesse contexto, o surgimento dos *weareables* (ou em português tecnologia vestível) possibilita novas formas de interação do turista com o espaço físico e sociocultural. *Wearables* são dispositivos tecnológicos, usados junto ao corpo do usuário, capazes de oferecer novas experiências. Essa tecnologia vem sendo implementada no setor de eventos e em alguns empreendimentos e destinos turísticos. Contudo, observou-se a ausência de um artigo de revisão sobre o assunto. Assim, este artigo tem como objetivo, analisar a produção científica presente nas bases de dados Scopus e Web of Science. Adicionalmente, também foram buscados artigos na base Scielo, a fim de contemplar estudos no contexto brasileiro. Ao total foram encontrados 55 artigos, sendo que 24 possuíam os critérios elegidos para análise. Após examinar estas publicações, foi possível observar a evolução temporal das pesquisas sobre o uso de *wearables* no turismo. Dentre os dispositivos contemplados pelos artigos, os mais estudados foram os óculos inteligentes, que podem possuir a funcionalidade da realidade virtual ou da realidade aumentada. Por fim, cabe ressaltar que apesar da relevância do tema e de já existirem alguns casos de tecnologias vestíveis utilizadas em destinos brasileiros, não foram encontrados artigos que

estudassem os *wearables* no contexto nacional, indicando assim, a importância de novas pesquisas sobre o tema.

Palavras-chave: *Wearable*, TIC, Turismo, Vestível, Revisão de Literatura.

ABSTRACT

Information and communication technology (ICT) has been playing a fundamental role in tourism. In this context, the emergence of wearable devices enables new forms of interaction between tourists and the physical and social-cultural space. Wearables are technological apparatus used close to the user's body, capable of offering new experiences. This technology has been implemented in the events sector and in some tourist enterprises and destinations. Nevertheless, the absence of a literature review on the subject was noted. Thus, this article aims to analyze the scientific production present in the Scopus and Web of Science databases. Additionally, articles were also searched in the Scielo database, in order to contemplate studies in the Brazilian context. In total, 55 articles were found, 24 of which met the criteria chosen for analysis. After examining these publications, it was possible to observe the temporal evolution of research on the use of wearable in tourism. Among the devices covered in the articles, the most studied were smart glasses, which can have the functionality of virtual reality or augmented reality. Finally, it is noteworthy that despite the relevance of the topic, and the fact that there are already some cases of wearable technologies being used in Brazilian destinations, no articles addressing the use of wearables in the national context were found. As such, new studies on the subject are needed.

Keywords: Wearable, Information and Communication Technology, Tourism, Literature Review.

INTRODUCTION

The expansion of information and communication technologies (ICTs) has become the main determinant in economic, social and human development (Dertouzos, 1997; Khasawneh & Ibrahim, 2012). This way, the

evolution and diffusion of such technologies have influenced both management of organizations in the public and private sector, as well as the lifestyle and people's way of traveling (Cavalheiro, Cavalheiro, Mayer, & Marques, 2021).

In fact, since the sixties , with the development of the first Global Distribution System (GDS), the ICTs have transformed tourism globally (Thakran & Verma, 2013). Advances such as the advent of the internet, the massification of social media, and the popularization of smartphones have brought structural modifications in all tourism value chains (Werthner et al., 2015). Within this context, some authors (e.g. Ortiz Rincon, Tommasini, Rainoldi, & Egger, 2017; Tussyadiah, Jung, & tom Dieck, 2018) point out that the *wearables devices* as the next "game-changer" in tourism development.

Although there is not a clear and consensual concept in the existing literature, *wearables* may be defined as different forms of technological artifacts used on the body (Atembe, 2015). According to Cicek (2015), such wearable devices have become viable with the onset technologies such as electronic chips, GPS systems, Wi-Fi systems, internet, computers, sensors, and advances in nanotechnology.

Weareables, may be materialized in several forms, ranging from a wristband to a pair of glasses, and are capable of assuming body functions of their users (for example, to look, to feel, to perceive) (Tussyadiah et al., 2018). In addition, since these artifacts have components both from computers and from mobile communication, they are able to interact with the environment (Donati, 2004). Therefore, the use of wearable devices will transform the way that people will sense their surroundings and consequently, will start to mediate the tourism experience (Ortiz Rincon et al., 2017).

Despite the growing importance of wearables, there is a lack of a literature review on the use of such devices in the tourism context. In order to collaborate with filling such gap, the present study aims to analyze the scientific production available in the two main international data basis (Scopus and Web of Science), on the use of wearable technologies in tourism. It was

observed that the wearable technology, although promising, is still in experimentation phase. Additionally, the most studied wearable devices are intelligent glasses associated to augmented or virtual reality.

At last, we also made an effort to contemplate Brazilian articles in this study. However, the search held in the Scielo data base did not return any national article on the theme. As such, in addition to discussing the results found in the literature review, some Brazilian cases on the usage of wearables in tourism are mentioned.

THE WEARABLE TECHNOLOGY

The technological advances which occurred in the last decades enabled the electronic devices to get even smaller and faster to users. Currently, the technology may be worn, used together or on the body, through wearable devices, also called as *wearable computer* (or, in the reduced form, *wearcomp)* and *wearable technology* (Donati, 2004).

According to Jhajharia, Pal & Verma (2014), wearable devices made it easer the interaction between human and technology.. Conceived as little portable computers, incorporated into the personal space of users, always accessible and ready, *wearables* are able to provide sensorial resources and scanning, such as *biofeedback* and tracking of the physiological function (Sundaravadivel et al., 2020). Additionally, the use of technology attached to the body enables the expansion of cognitive and motor functions of the users, helping them adapt their behavior according to the environment (Tussyadiah et al., 2018).

The proliferation of wearable technologies associated to universal connectivity, have modified the way people access information and interact with other individuals (Zaman et al., 2015). Since *wearables* are equipped with communication technologies, they enable the exchange of information with users and with other technology gadgets connected on "The Internet of Things" (*IoT*) (Mighali et al., 2015). The concept of IoT refers to a net of objects, such as *tags* RFID, sensors, mobiles and other technological devices, which,

through wireless communication, are able to interact with each other (Vermesan & Friess, 2013). Therefore, due to the current omnipresence of such intelligent devices, including *wearables*, people may find several useful and real time information on their surroundings, such as weather and road traffic data (Matsuda et al., 2018).

This way, through *wearables,* the human body and technology stop "working as independent machinery to participate in the information process, where digital and physical data operate concomitantly, allowing users to affect and to be affected simultaneously by different realities" (Donati, 2004, p. 96.). Many sectors are being transformed by the adoption of wearable technologies (e.g.: Medicine, tourism, entertainment, fitness, games and lifestyle) (Cicek, 2015). Nowadays, there are available in the market wearable devices in the form of glasses, watches, wristbands, wireless phones, clothing and tennis.

THE WEARABLES MARKET

According to Santos (2018) the market of *wearables* started to consolidate from the 2010's decade, when Google developed the first prototype of an intelligent pair of glasses, which would become Google Glass. As follows, other companies such as *Fitbit*, Apple, Levis, Samsung, launched portable devices with wearable technology. Nowadays, the offer of *wearables* is extremely linked to health issues, such as to monitor the heartbeat, the blood pressure, or even count daily steps and calories spent during a physical workout. The main device used for such purpose are the *smartbands*, such as *FuelBand*, produced by Nike, and *miCoach*, by Adidas (Marini, 2017).

In Brazil, some banks adopted the intelligent wristbands as an alternative for payments with the option of charge or credit. Such devices contain the technology *Near Field Communication - NFC*. For example, the Bank of Brazil enables to their clients the Ourcard Wristband and the Band Active, which in addition of having the function of payments, monitors health issues, with pedometer, tracking, sleep tracking and reminders of exercises (Banco do

Brasil, n.d.). On the other hand, Bradesco Bank, in partnership with Visa, launched during the Olympic Games of 2016, the Bradesco Visa wristband (VISA, 2016). Santander bank also offers to their clients the proximity payment form through the wristband and in *tags* to be adapted in other watches (Santander, n.d.).

Another technological wearable product that has been gaining popularity is the *smartwatch*. Such device, offered by several companies, has several functionalities, beyond the main function of traditional watches. Each brand presents differentiated advantages. *Apple* entered the market of *wearable*s with the A*pple Watch*, allying waterproof design and integrated GPS, in addition to other functions related to health and integration with the mobile (Apple, n.d.). On the other hand, Samsung has in its line of *wearables*, the Samsung *Galaxy Watch*, which offers apps related to health, music, GPS, *Bluetooth* connectivity to android mobiles (SAMSUNG, n.d.). Garmin calls its intelligent watch as *vívoactive,* which is more turned to the practice of sports (Garmin, n.d.) Adittionally, Xiaomi, a Chinese company of electronics, brought to the market 3 types of *smartwatches*, offering quality and more accessible prices. The three models are: *Mi Band, Amazifit*, and wristbands (Xiaomi, n.d.). Other watches such as *MyKronoz, ZeWatch, i-Joy I-Watxer Reloj, Meteor* and *MetaWatch Strata*, are examples of *smartwatches* which have low prices, showing the expansion of the device in the market and its range of offers (Gazzarrrini, 2014).

On the segment of intelligent glasses, Google was one of the pioneer companies. Google Glass was an experimental project of the company which had its development started in 2006 and made it public in 2012. The purpose of the device was to provide useful information in the foreground, with the concept known as augmented reality. The device would allow the user, for example, to have directly at sight, the direction to arrive in a certain place, instead of looking to the GPS screen. Despite the pioneering spirit, the device did not hit the market, since, issues related to privacy make the experiment to be terminated (Alves, 2019). However, the market of virtual reality glasses, in

which the user sees him/herself in another reality, has been showing to be promising in the sectors of games and movies (SAMSUNG, n.d.).

When we use the term wearable, a sector that is many times remembered is clothing. Although this segment of *wearables* is still a little more distant from the final consumer than the previously metioned, intelligent clothing are already a reality (Hanlon, 2005). Some prototypes of intelligent clothing were programmed to monitor movements, heartbeat, breathing and other vital signs of users and to send these information in real time to computers and smartphones. Google's group of Advance Technology and Project (ATAP), together with Levi's, developed a textile device with wearable technology features, called Jacquard. (Jacquard, n.d.). The Jacket is the first digital platform in large scale created for intelligent clothing, changing the way to access services and information. It possesses an intelligent fabric, which allows the connection to the mobile device. The user with touching gestures may access different functions, such as how to obtain directions, exchange music and answer phone calls. With Jacquard's abilities, the interaction with the digital world happens without interrupting what is happening in the real world. It is worth mentioning that Adidas, in partnership with Polar, has launched a clothing line in women's and men's version, in which is possible to attach a rigid wearable object of heart monitoring, the *miCoach* (Hanlon, 2005).

Foot accessories are not left out of the list of wearable technologies. Nike has launched the Nike Adapt Huarache, which may be connected to the *smartwatch* through the company's app promoting the user's interaction with the environment. The technology still offers voice command, for example, to loosen the laces, leaving aside the regular shoelace (Vieira, 2019).

Therefore, there are several types of *wearables*, with several functionalities. Although the usage of *tablets and* smartphones is already part of the daily lives of most people, the popularization of wearables has the potential of significantly changing the way that users interact with technology, including during the trip (Ortiz Rincon et al., 2017).

THE WEARABLE TECHNOLOGY IN TOURISM

The interaction of tourists with the physical and social cultural space is the central factor of the tourism experience. Nowadays, such experiences are being increasingly mediated by the use of Information and Communication Technologies (ICT)(Cavalheiro et al., 2020; Lima et al., 2021). These technologies play a facilitating role in the tourism experience by helping, providing and/or limiting the access to tourism activities (Barbosa & Medaglia, 2020; Neuhofer et al., 2015).

As explained by Tussyadiah et al., (2018), it is increasingly difficult to separate ICTs from tourism experiences.. Currently, tourists carry and use their personal devices, such as smartphones, all the time. As a result, they are always connected and have access to excellent computing resources while on the move. On the other hand, tourism destinations provide technological systems such as mobile applications and sensors to assist tourists in interacting with the environment around them, searching for information and navigation, interpreting cultural attractions, etc. (Acosta et al., 2018; Feitosa & Barbosa, 2020).

More recently, the focus of the development of ICTs for personal use has taken a new innovation leap and has shifted from the development of portable devices to the creation of wearable devices (Cicek, 2015). These wearables are able to extend the sensory and cognitive modality of their users, shaping the way tourists orient themselves, interact and control their interactions with tourist attractions.. On the other hand, the use of *wearables* together with the virtual reality technology, offers a new perspective for the commerce of tourism products (Marasco et al., 2018).

Despite the potential of transformation that wearable devices bring to the tourism sector, the literature on the theme is still incipient. It was also observed that there are no studies that review the literature produced on this topic. This way, with the purpose of searching, analyzing and exploring the accumulated knowledge on *wearables* in tourism, a bibliographic study was proposed.

METHODOLOGY

The present study may be classified as descriptive, since it has the purpose to expose characteristics of a certain phenomenon (Vergara, 2000). On the other hand, this study also has exploratory character, since it analyzes a theme that there is little accumulated and systematized knowledge (Schlüter, 2003). Additionally, the method used was the bibliometric research, that according to Nascimento, Meneghatt, Hsu, & Silva (2019, p.6), is "a way to be able to measure the advances of Science, identifying the paths adopted by researchers, the productivity and the quality researched up to the point".

In this section, we will present the procedures adopted to operationalize such research. First, in order to gather the main studies on wearable devices in tourism, searches were made for articles published in scientific journals and conference proceedings in the two main international databases (Scopus and Web of Science). The consults were performed during the month of February 2021.

The search terms entered to extract the articles were "*tourism AND wearable AND technology*". In the Scopus database, terms were searched in the title or abstract or keywords fields, and 46 articles were found. In the Web of Science database, the search was performed in topics and returned 27 articles. In order to create a unique data base, we excluded the articles in duplicate (the ones present in both data bases), maintaining only one version of them. Our initial sample had 55 articles.

Next, the abstracts of the 55 articles were analyzed to confirm whether all studies belonged to the theme of wearable devices in the context of tourism. It was observed that many of such articles studied the use of wearables in other contexts, such as health, and the word "*tourism*" was only used to exemplify a sector in which such technology has been adopted. Other researches addressed the topic of technology in tourism,, however the word *wearable* was used only once, as one more example of technology. Additionally, some studies, carried out in the context of tourism, had the purpose of analyzing other themes, such as emotion, and the *wearable* device

was used in the methodological procedure to measure some variables in the study, such as, for example, heart beats.

After eliminating all articles that did not address the use of *wearable*s in tourism, we remained with a sample of 24 articles. Such studies were were read in full and we analyzed the types of wearable devices used, their functionalities and their perspectives for the tourism sector.

It is also worth mentioning that, a priori, it was intended to contemplate national articles in this study. Two searches were performed in the Scielo data base with the following entries: "tourism and wearable technology" and "tourism and technology and *wearable*", however, both searches did not return a single article. As such, in addition to presenting the results found, we will mention in the discussion some Brazilian cases of the use of *wearables* in tourism.

RESULTS

Since this is a relatively recent subject, we chose not to delimit the date in our search for articles that addressed the use of wearable devices in tourism. With that, it was possible to also analyze the time evolution of the researches on the theme. The older article which we found was published in 2011, corroborating to what was exposed by Santos (2018), that the market of *wearables* started to consolidate from the decade of 2010. This pioneer research (Omino, 2011) presents a field study of a prototype of a remote tourism guide with *Tele Scouter* (kind of intelligent glasses with a projector in one of the lenses), produced by the company NEC. The result of the study pointed out that the *wearable* was capable of offering a high level service of tourism guidance. On the other hand, users who participate in the research complained about the weight of the device and informed that sometimes it slipped, making the locomotion difficult.

In figure 01, we present the chronological evolution of the scientific production on tourism wearables, considering the number of published articles.

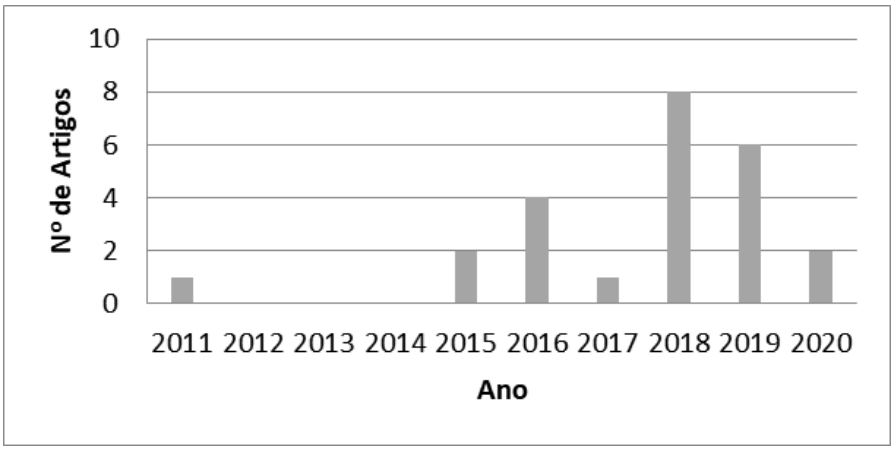

FIGURE 01 – Chronological evolution of the publication on tourism wearables
Source: Data of the research (2021)

Through the reading of the articles, we observe that the most studied wearable technology in the context of tourism are the intelligent glasses, which can be used for virtual reality or augmented reality. While in virtual reality (VR), the user's device is inserted in an artificial environment, in the augmented reality (AR), virtual elements are inserted in the real world (Baktash, Nair, Subramonian, et al., 2016). In fact, since the glasses' lens are transparent, the data generated as text, 3D objects, video and location information by GPS are overlapping in the vision of the real world (tom Dieck, Jung, & tom Dieck, 2018).

This way, AR and VR assume distinct function in the context of tourism. The VR devices have shown to be powerful tools for the marketing of destinations and tourism products (Marasco et al., 2018) and for the planning of the trip (Acosta et al., 2018). With the use of a glass of virtual reality, the consumer may, in a certain way, experience and get to know the product better. Additionally, such VR devices also have the function of improving the tourist's experience, as for example, in attractions in amusement parts (Jung et al., 2018), or in museum and areas of cultural heritage, reproducing an ancient environment, with monuments and habits which have disappeared over time (Errichiello et al., 2019).

On the other hand, in the context of tourism, the augmented reality glasses have been used assuming functions as guide and translation (Zaman et al., 2015). This way, Tussyadiah et al. (2018) stated that the augmented reality

will start to mediate the tourism experience. Some experimental studies have analyzed the interaction of tourists with AR in museum and art galleries, such as tom Dieck et al. (2018), which observed that the learning capacity of the visitor was augmented with the use of AR. In the same way, Jung et al. (2020) verified that a good experience with AR made that the visitor had more interest on the objects of an art gallery or museum, at the same time that increases the intention of re-visiting the place.

In addition to the issues associated to the functionalities of the intelligent glasses, Saoud & Jung (2018), analyzed ethical dilemmas which have accompanied the popularization of AR and VR. Such authors highlighted that a fusion between the physical and digital world will create a "magic circle" where the rules will not be the same, demanding changes or even addition to our ethical concepts and moral codes.

Other categories of wearable devices, such as smartwatches and bracelets, were also analyzed in some articles. In table 01 we organize our sample according to the devices used in each research.

Wearable	**Articles**
Intelligent glasses (AR)	(Baktash, Nair, Subramonian, et al., 2016; Baktash, Nair, & Subramonian, 2016; Jung et al., 2020 ; Omino, 2011; Saoud & Jung, 2018; sTao, 2017; tom Dieck et al., 2018; I. P. Tussyadiah et al., 2018; Zaman et al., 2015)
Intelligent glasses (VR)	(Acosta et al., 2018; Errichiello et al., 2019; Jung et al., 2018; Marasco et al., 2018; Saoud & Jung, 2018; Shukla & Verma, 2019; Zhang et al., 2018)
Intelligent watch	(Baf, Debeljuh, & Slivar, 2018; Chen & Yang, 2019; Costa et al., 2019; Liang, Nakatani, Kunze, & Minamizawa, 2016)
Intelligent wristband	(Amaro & Oliveira, 2019; Baf et al., 2018; Sundaravadivel et al., 2020)
Camera	(Dinhopl & Gretzel, 2016)
Not Specific	(Mighali et al., 2015; Perez-Aranda et al., 2019)

CHART 01 – Types of wearable devices
Source: Elaborated by the authors (2021)

Both the wristband and the intelligent watches are presented as accessories to be used in addition to the apps installed in the smartphone. For example, Liang et al. (2016) proposed a *Walking Holidays* on the streets of Tokyo, with guidance made by an intelligent watch (*Apple Watch*) and an iPhone 5s, which in addition of offering information and tourism interaction, monitor physiological data such as heart been and blood pressure. All these personal information are combined with GPS, and through them, multidimensional data are generated from which it is possible to extract specific information such as evaluation of the city and the level of stress of tourists, in addition to the possibility of taken photographs. This way, through the use of technology, tourists may enjoy personalized services.

Another factor observed in the case of wristbands and intelligent watches is that the main function executed by such wearables in the context of tourism is to monitor physiological issues (i.e. heart beat, blood pressure) and the location of the user. Therefore, Sundaravadivel et al. (2020) proposed an app for a safe trip, in which the program, associated to a wristband, monitors the tourist's health and, in case some problem occurs, the user receives a notification from a medical center near him/her.

It is worth mentioning that one of the articles from our sample brought the case of the camera that could be used together with the body to register the moments of the experience of the tourist (Dinhopl & Gretzel, 2016). In fact, tourists record more videos each day during the vacation, and the camera used together with the body offers a new perspective to "record the moment".

In the following section, we will discuss the results here written and point out opportunities and challenges for the development of wearable technologies in tourism.

DISCUSSION

As exposed in the previous section, the majority wearables studied within the context of tourism are glasses that incorporate VR or AR. However, such devices are in experimentation phase and it is still uncertain whether they will

be absorbed by society, as an interesting and economically viable product (Saoud & Jung, 2018). In fact, the majority of the studies in our sample, mainly those related to augmented reality, presented results from prototypes to be implemented, instead of analyzing products already adopted in the destinations. According to what was explained by tom Dieck & Jung (2017), AR is an expensive technology and managers are still in doubt whether the benefits to be received will overcome the costs of the investment.

Unlike glasses of augmented reality, which are offered or rented by the destinations, such as in museums and cultural heritage locations, the wristbands and the intelligent watches are properties of the users, in addition to being products with more accessible prices. On the other hand, despite being in a more advanced phase of market insertion than the intelligent glasses, they are still not popular products such as the smartphones (Ortiz Rincon et al., 2017). In fact, many of those devices are seen as an extension of the smartphones, being necessary to use them in group.

Regarding the functionality of intelligent watches and wristbands, it was observed that the articles limited in analyzing devices capable of monitoring vital signs and the location of users. From the collection of such data, personalized services may be offered to the tourists (Chen & Yang, 2019). However, despite being an already implemented service in tourism destinations, there were no articles that analyzed the use of intelligent wristbands as a form of payment in the sample.. For example, at the Walt Disney World Resort, in Florida (United States), an intelligent wristband (Magic Band) is offered to the visitors, which serves as a form of payment, in addition of working as an entrance to parks and key to the apartments in hotels of the resort (Atembe, 2015).

In addition, although we didn't find articles that approached the use of wearable technologies in tourism in the Scielo data base, there are already some cases implemented in Brazil. In 2019, in the Fernando de Noronha group of islands – PE, the device "NADA Noronha" was launched, an intelligent wristband with the functionality of payment through VISA and netPDV. The

wearable technology is accepted in the majority of the establishments in the island and the wristband is available for purchase in 100 establishments. Also, the security of the payment technology by proximity also allows the withdrawal of the money left after the trip to the user's banking account again.. All data from the wristband are digital. The idea is to provide not only easiness in the form of payment, but also to guarantee greater liberty to the tourist, once in the same wristband the name of the user may be registered, the blood type, hotel in which he/she is registered, information about a guest and further data in case of emergency (Nada, n.d.).

Another example of the use of wearables in Brazil, in the shape of an intelligent wristband, is the Digital Voucher, implemented in the city of Barreirinhas (MA), nationally and internationally known as one of the most searched places in Brazil due to the beauties of the Lençóis Maranhenses National Park. The Digital Voucher is helping organize the tourism activity in the Lençóis Maranhenses National Park, monitoring the access of tourists and allowing the city to raise the generated taxes correctly; it loads all data from the tourist who visits the park, such as the origin, destination, time of permanence, travel agency and hotel (Pereira, 2019). To access the park, the visitor must go through a scanner, and all data are shared in real-time by the system's operator. A tourism segment adopting the use of intelligent wristbands in Brazil is the events sector. For example, the Lollapalooza Brazil brought in the editions of 2018 and 2019, the "*Lolla Cashless by Next*" which worked as a ticket and allowed the purchase of food, drinks and official products, being the only form of payment within the festival. In the event's site, the benefits of payments with the wristbands are very clear: faster transactions, shorter lines, no need of change, less risk of loss, better control of the expenses, history of transactions via e-mail, enabling reimbursement (Lollapalooza, 2019). Other events such as *Tomorrowland* Brazil (Junior, 2016) and the rock festival João Rock, which happens in the city of Ribeirão Preto (João Rock, 2019), have also implemented the use of intelligent wristbands as ease to the public.

Therefore, the use of such intelligent wristbands shows that the technology in wearable devices is a trend for destinations, parks and events, in terms of control on tourism activity, practicality, and security regarding the users.

FINAL CONSIDERATIONS

With the fast advance of the Information and Communication Technologies (ICTs), several sectors have been undergoing transformation, including trips and tourism. Within this context, the advent of wearable technology brings new opportunities and challenges for the development of tourism. The wearable devices enable tourists to have a more agile, healthy and practical lifestyle, making its growth in the market to be each day higher. However, the literature on the subject is still incipient.

The present study had the purpose of reviewing the academic production on the use of wearable devices in tourism. Due to the lack of studies on such technologies within the Brazilian context, it aimed at identifying and describing some relevant cases present in national territory.

As a contribution to the literature, the present study presents the chronological evolution of the academic production on the subject. In addition, the wearable devices investigated up to this moment are described. This way, we have observed that intelligent glasses for virtual or augmented reality projection are the most approached among the analyzed articles. However, this is still a device far from consumers due to the high investment required and the uncertainty of benefits. In addition to presenting the devices analyzed by the studies that composed our sample, we also introduced some Brazilian cases of intelligent wristbands. We suggest further research of such cases, so it becomes possible to understand better the relation of tourists with wearables in Brazil and their results for destinations and producers of events. Moreover, the present article also brings contributions for managers by observing that tourism is a sector that needs to be prepared to receive such new technology, guaranteeing the tourists' satisfaction. The list of

wearable devices described in this study and the examples here presented may help managers to get to know and to implement wearables in their enterprises or destinations.

At last, it is necessary to recognize the limitations of this research. First, we only included academic studies present in the Scopus and Web of Science databases in our sample. We suggest that future researches amplify such search to other bases and that books on the subject may also be analyzed. Second, the search was performed using the word *weareable*, considering that such a generic word would be in all articles regarding wearable devices. However, some studies may use only the name of the specific technology, such as intelligent watches or glasses with augmented reality. This way, with the knowledge of the types and devices used in tourism presented in the present article, we suggest that reviews should be done, including in the search the specific name of each modality of weareable.

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