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Analysis of the attributes of Smart Tourism Technologies in destination chatbots that influence tourist satisfaction.

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Abstract

Chatbots are an emerging technology that is disrupting the tourism industry. Despite their implementation in companies and at destinations, there is little research that evaluates chatbots' smart tourism technology (STT) attributes and their influence on tourist satisfaction. This study seeks to examine the relationship between informativeness, empathy, accessibility, interactivity and chatbot user satisfaction. The research was based on an experiment and a survey conducted on a sample of 468 potential tourists who used a chatbot during their trip. Statistical tools such as exploratory factor analysis and the hierarchical regression method were used in the data analysis. The results suggest that informativeness, empathy and interactivity of destination chatbots are the attributes that influence and predict tourist satisfaction while accessibility does not. The main contribution of this study is the analysis of the attributes of STTs applied to destination

chatbots, which also provides valuable information for both tourism chatbot developers and smart destination managers who wish to adopt this technology.

Keywords: Chatbot, Smart Tourism Technology, Informativeness, empathy, accessibility, interactivity, user satisfaction

1. Introduction

New technologies are bringing about changes in the management of tourist destinations (Buhalis, Dimitrios, Amaranggana, 2015; Gretzel, Sigala, Xiang, & Koo, 2015; Ivars-Baidal, Celdrán-Bernabeu, Mazón, & Perles-Ivars, 2019) fostering the emergence of a new type of destination: smart tourism destinations (STDs) (Buonincontri, P., & Micera, 2016; Gretzel, Sigala, Xiang, & Koo, 2015; Jovicic, 2019). STDs are complex ecosystems that apply information and communication technologies (Boes, Buhalis, & Inversini, 2016; Gretzel, U., Werthner, H., Koo, C., & Lamsfus, 2015) and smart tourism technologies (STTs) to enable better interaction between tourism service providers and tourists in order to exchange and share information and knowledge instantly (Jovicic, 2019), to achieve more satisfactory tourist experiences (Boes, K., Buhalis, D. & Inversini, 2015; Buhalis, D., & Amaranggana, 2013).

Technologies at STDs improve the co-creation of tourist experiences and enhance destination competitiveness (Buonincontri, P., & Micera, 2016). Smart Tourism Technologies (STTs) are new emerging channels (Gretzel et al., 2015; Wang, D., Xiang, Z., & Fesenmaier, 2014) that are radically changing the traditional experience of tourist services (Ostrom, Amy L., A. Parasuraman, David E. Bowen, Lia Patricio, 2015). In this context, technological agents like chatbots are becoming the new tourism actors that provide innovative experiences and disrupt the tourism value chain (Sigala, 2017).

Chatbots are an emergent technology that is rapidly being implemented in various fields and economic sectors. Chatbots are computer programs that interact with users in natural language (Shawar, B. A., & Atwell, 2007). They are designed to communicate using text or spoken words and to respond interactively in a conversation with humans (Allison, 2012; Chaves & Gerosa, 2019; Shawar, B. A., & Atwell, 2002). Chatbots are one of the most prominent examples of the emerging artificial intelligence (AI) technologies.

In the tourism industry, chatbots are generating substantial changes (Huang et al., 2018) in communication with tourists (Nica, Tazl, & Wotawa, 2018) and in tourism services (Sano, A. V. D., Imanuel, T. D., Calista, M. I., Nindito, H., & Condrobimo, 2018), with rapid, widespread diffusion. Chatbots can answer tourists' questions about the attractions that can be visited at a destination (Sano, A. V. D., Imanuel, T. D., Calista, M. I., Nindito, H., & Condrobimo, 2018) or provide tourists with recommendations about hotels (Nica, I., Tazl, O. A., & Wotawa, 2018) or other tourist services. However, studies on chatbots in tourism are still very scarce (Ivanov, S. H., & Webster, 2017) and focus mainly on the design and development of the system architecture and its capabilities (Clarizia et al., 2019; Sano, A. V. D., Imanuel, T. D., Calista, M. I., Nindito, H., & Condrobimo, 2018).

Tourists' experiences with smart tourism technologies (STTs) at tourist destinations is a key factor in their overall satisfaction with the destination and their intention to visit it again (Boes et al., 2015; Buhalis & Amaranggana, 2013; Gretzel et al., 2015). Previous studies focused on describing the use of STTs at the destination (No & Kim, 2015) but none have analysed the attributes of STTs on destination chatbots in order to predict tourist satisfaction. Therefore, this study aims to identify which attributes of STTs (i.e., informativeness, interactivity, accessibility and empathy) predict tourists' satisfaction with their use of chatbots.

Consequently, the objective of this study was to examine the relationship between STT attributes of destination chatbots and users' satisfaction. The results of this research provide Destination Management Organizations (DMOs) and chatbot creators with guidelines to better understand chatbot users in order to improve destination chatbots' attributes and tourist satisfaction at the destination.

2. Literature review

Chatbots in smart tourism

Chatbots are gaining adoption in the tourism industry due to the high flow of communication that the tourist needs with the destination and with tourism service providers (Calvaresi, D., Ibrahim, A., Calbimonte, J. P., Schegg, R., Fragniere, E., & Schumacher, 2021; Ukpabi, Aslam, & Karjaluo, 2019). There are two types of chatbots recognized by different authors (Kumar, R., Li, A. and Wang, 2018; Samala, N., Katkam, B.S., Bellamkonda, R.S. and Rodriguez, 2020): text message-based chatbots, that provide written messages to the tourists' questions and voice based chatbots, that provide voice messages. Both are being rapidly adopted in the tourism industry. In restaurants chatbots are used to answer questions about the menu, order the menu or reserve places (Berezina, K., Ciftci, O., & Cobanoglu, 2019; Hsu, Zhao, Liao, Liu, & Wang, 2017; Kim, H., Jung, S., & Ryu, 2020; Leung, X. Y., & Wen, 2020; Ukpabi et al., 2019). In hotels chatbots allow guests to order food services, cab services, to read out the messages, to schedule appointments, room services, house-keeping services or to inform about the hotel facilities among others (Buhalis, D., & Cheng, 2020; Nica et al., 2018; Parmar, Meshram, Parmar, Patel, & Desai, 2019). Chatbots are also used in transportation (Jiménez-Barreto, J., Rubio, N., & Molinillo, 2021; Negi, Joshi, Chalamalla, & Subramaniam, 2009). Airlines like KLM "BlueBot", Kayak, British Airways or Austrian Airlines use chatbots to meet flight reservation requirements; and tourist destinations such as Malaga and

Murcia use them to provide tourist information about the place. This adoption and specialization in different areas allows the recognition of different categories of chatbots: restaurant chatbots, hotel chatbots, transportation chatbots or destination chatbots.

Despite the rapid adoption of chatbots in the tourism sector, academic studies on the subject are still scarce (Ivanov, S. H., & Webster, 2017). Related studies about robots in the tourism sector, especially in the hospitality industry (Kuo, C. M., Chen, L. C., & Tseng, 2017; Murphy, J., Hofacker, C., & Gretzel, 2017; Tussyadiah, I., & Miller, 2019) are emerging. But studies on chatbots in tourism are still scarce (Ivanov, S. H., & Webster, 2017) and are practically non-existent on destination chatbots. Studies mainly present prototypes of chatbots and describe their contributions to the tourism sector (Garrido, P., Seron, F. J., Barrachina, J., & Martinez, 2017), while others analyse aspects of chatbots and their impact on the sector (Chaves & Gerosa, 2019; Ivanov, S. H., & Webster, 2017; Nica et al., 2018).

Although it is true that chatbots will never be able to get the human touch that is a key aspect for a satisfactory experiential tourism (Samala, N., Katkam, B.S., Bellamkonda, R.S. and Rodriguez, 2020), chatbots bring great benefits to the tourism industry. Chatbots allow automated and personalized travel services, tourist information and also facilitate to make travel arrangements in real time, 24 hours a day (Samala, N., Katkam, B.S., Bellamkonda, R.S. and Rodriguez, 2020), increasing user satisfaction (Winkler & Söllner, 2018). But what aspects of chatbots generate the most satisfaction among tourists when they seek information at the destination? In this line, our study seeks to find out what are the attributes of STTs [informativeness, accessibility, interactivity] (No & Kim, 2015) and empathy (Zhou, Gao, Li, & Shum, 2020)] that explain and predict satisfaction when using chatbots.

The attributes of Smart Tourism Technologies

In the context of smart tourism, STTs allow tourists easy access to information on destination transportation, accommodation, and attractions through their smartphones when they need it (Hew, J. J., Leong, L. Y., Tan, G. W. H., Lee, V. H., & Ooi, 2018). STTs include information and communication technologies such as tourism apps, DMO websites and social media platforms, as well as other technologies like cloud computing, big data, IoT, artificial intelligence (AI), virtual reality (VR), augmented reality (AR) and mixed reality, among others (Pai, Liu, Kang, & Dai, 2020). New STTs are emerging and they are also diversifying (Jeong, M., & Shin, 2020) and are used throughout the entire travel process (Pai et al., 2020). STTs provide real-time information at destinations, but they also allow communication with other tourists and tourism marketers, thus helping tourists to make better travel decisions (Chung, N., & Koo, 2015).

Previous studies analysed different attributes of STTs on different platforms. No and Kim (No & Kim, 2015) analysed five attributes (accessibility, security, information-trust, interaction, and personalization) on blogs, public websites, company websites, and social media websites. Later, Huang, Goo, Nam, and Yoo (C. D. Huang, Goo, Nam, & Yoo, 2017) reduced the attributes of STTs to four (informativeness, accessibility, interactivity, and personalization) to analyse tourist satisfaction on tourism websites, social media, and smartphones in travel planning. More recently, Pai et al. (Pai et al., 2020) adapted the five attributes of No and Kim (No & Kim, 2015) (informativeness, accessibility, interactivity, personalization, and security) to analyse tourist experience satisfaction on all STTs at a destination (Macau). We have adapted these attributes of STTs to the study of destination chatbots, removing personalization and security, which are meaningless for chatbots, and adding one important attribute for them: empathy.

Informativeness

'Informativeness' can be defined as the extent to which users perceive virtual agents as capable of effectively providing relevant information (Li & Mao, 2015). Informativeness in the context of tourism refers to a synergy between the quality and reliability of the information provided by STTs at tourist destinations. (Huang et al., 2017). In this study, informativeness refers to the perception the tourist has of receiving relevant, reliable, quality information from the chatbot, during a conversational session.

Trust in chatbots is predicted by chatbot characteristics, such as credibility and informativeness (Yen & Chiang, 2020). Consumers' perceived informativeness is positively associated with their trust in chatbots (Yen & Chiang, 2020). Moreover, the perceived informativeness of a company's website is directly related to the perceptions of the products the company offers (Siau & Shen, 2003). Recent projects have designed algorithms with a topic-aware convolutional neural tensor network (TACNTN) to improve the information capacity emitted in a response for retrieval-based chatbots (Wu, Li, Wu, & Zhou, 2018).

The quality of the information stimulates user satisfaction (DeLone & McLean, 1992) and influences consumer satisfaction (Ashfaq, Yun, Yu, & Loureiro, 2020). Informativeness positively and significantly influences the quality of responses in collaborative human-chatbot systems (Jiang & Ahuja, 2020). Additionally, access to sufficient, accurate, precise, up-to-date, reliable information plays a decisive role in users' satisfaction (Veeramootoo, Nunkoo, & Dwivedi, 2018). These characteristics help tourists in the process of planning their trip, generating satisfaction and a positive perception of tourism technologies. (Park, Gretzel, & Sirakaya-Turk, 2007). Moreover, tourism technologies that generate quality information can reduce the cognitive effort of individuals in decision-making processes (Pai et al., 2020; Yoo, Goo, Huang, Nam, &

Woo, 2017). Therefore, informativeness remains a major challenge for future exploration in chatbots (Tam, 2020). This leads us to explore the following hypothesis:

H1: Satisfaction in the use of chatbots is explained by the tourist's perception of informativeness.

Empathy

Empathy is believed to be unique to humans (Nass, Lombard, Henriksen, & Steuer, 1995). Nonetheless, empathy can be defined in the technology context as the humanoid 'ability to identify understand and react to others' thoughts, feelings, behaviours and experiences' (Murray, Elms, & Curran, 2019). Empathy can be understood as a fundamental skill required for successful interfaces between users and social robots (Birnbbaum et al., 2016). Therefore, empathy is a pivotal aspect in the digital transformation of human-robot interaction in tourism (de Kervenoael, Hasan, Schwob, & Goh, 2020). Chatbots with empathic features emulate affective empathy (Liu & Sundar, 2018). In this study, a chatbot with empathy refers to its ability to identify the user's emotions from the conversation (Zhou et al., 2020).

Previous studies have shown (Leite, I., Castellano, G., Pereira, A., Martinho, C., & Paiva, 2014) that in tourism technologies, technological agents with the ability to show empathy and social-emotional behaviour generate more trust in the user. Along these lines, it has been shown that fully Natural Language Processing (NLP)-based chatbots need a touch of empathy and social engineering (Hu et al., 2018). In addition, other non-specific studies in the field of tourism have focused on analysing the effects of empathy and the emotions generated in human-chatbot communication. (Alam, Danieli, & Riccardi, 2018; Ho, Hancock, & Miner, 2018; Naous, Hokayem, & Hajj, 2020; Portela & Granell-Canut, 2017).

Additionally, it is known that the virtual agent's empathy toward human players in games influences individuals' perceptions as if they were coming from real humans (Brave, Nass, & Hutchinson, 2005). Stein and Ohler (2017) discovered that when a non-human agent provides responses indicating psychological processes on the affective dimension, it can elicit perceptions of uncanniness, which would confuse computers with humans. In their study about empathic expression and individuals' perceptions of the chatbot, Liu & Sundar (2018) determined that the pre-existing beliefs that users have about robotic intelligence influence the reactions of individuals to the empathy of a chatbot. Portela and Granell-Canut (2017) detected that during a chatbot-user interaction, the fact that the chatbot reminds the user of something they had said previously causes an empathy effect. The same happened when the chatbot asked for details about an anecdote previously expressed by the user or when the chatbot asked the user something personal. Likewise, de Kervenoael et al. (2020) detected that perceived empathy has a significant impact on intention to use social robots. Therefore, chatbots should display a minimal level of empathy, behave situationally and caringly (Zumstein, D., & Hundertmark, 2017). This leads us to explore the following hypothesis:

H2: Satisfaction in the use of the chatbot is explained by the tourist's perception of empathy.

Accessibility

In the existing literature, no studies or publications about chatbot accessibility were found (Torres, Franklin, & Martins, 2018), but accessibility has been studied regarding the mobile internet services of a destination (S. Kim & Garrison, 2009), websites (Kaplanidou & Vogt, 2006), blogs (Lee, 2010) or STTs in general (Pai et al., 2020). Accessibility in tourism technologies is defined as the degree to which a visitor accesses sources easily, during the trip, using intelligent technology systems such as the internet,

mobile applications (No & Kim, 2015). In this study, accessibility refers to ease, in terms of use and access [without complications], of access to the services or contents of the chatbot, by current or potential tourists.

Accessibility is a factor that is associated with the usability of STTs (Xiang, Z., Wang, D., O’Leary, J. T., & Fesenmaier, 2015). As such, it is a significant factor between the experience of the service at the destination and the satisfaction of the tourist (Lee et al., 2018). Furthermore, it is an important factor for the joint creation of tourist experiences (Buhalis, D., & Amaranggana, 2013). STTs’ characteristics of accessibility have a positive influence on travel decision support satisfaction (Yoo et al., 2017). Perdue (2002) tested the usability of STTs and detected that when tourists perceive good accessibility in STTs, tourists’ overall travel quality increases. In the same line, Pai et al. (Pai et al., 2020) showed that accessibility was the most important attribute to affect the smart tourism technology experience and tourist satisfaction. However, another recent study showed that accessibility was not the primary factor for tourists to maximize a memorable experience at the destination (Jeong & Shin, 2019). All this leads us to explore the following hypothesis:

H3: Satisfaction in the use of the chatbot is explained by the tourist’s perception of accessibility.

Interactivity

According to the existing literature on interactivity, users perceive these systems as interactive when they are reciprocal, responsive, and quick to respond (Johnson, Bruner II, & Kumar, 2006). This is achieved when users are provided with immediate feedback (Klein, 2003). Psychological research on human-computer interaction indicates that interactivity (Nass & Moon, 2000) helps communication receivers view computers as a source of communication (Sundar & Nass, 2000).

It is especially interesting to investigate the interactivity of chatbots because interactivity is one of their key characteristics and increases their humanness (Go & Sundar, 2019). The use of a chatbot for interactive message exchange can be a promising tool to create positive user engagement and enjoyable user experiences (Ischen, Araujo, van Noort, Voorveld, & Smit, 2020).

The perceived interactivity, often referred to as experiential interactivity (Liu & Shrum, 2002), is effective in shaping user responses such as behavioural intentions and positive attitudes (Yang & Shen, 2018). In this study, the perceived interactivity of chatbots is considered as tourists' perceptions of their communications with chatbots in terms of responsiveness and the ease with which the content generated during the interaction can be shared.

Furthermore, the interaction with chatbots in comparison to interactive websites resulted in more enjoyable user experiences (Ischen et al., 2020). The interactivity of websites is an important antecedent to customer satisfaction in web-based consumer decision support systems (Garrity, Glassberg, Kim, Sanders, & Shin, 2005). Attributes of interactivity have been shown to influence outcomes such as interpersonal attraction and satisfaction (Lew, Walther, Pang, & Shin, 2018).

Baek et al. (Baek, Kim, & Lee, 2019), in their study of how the interactivity of a chatbot interface affects the user experience, found that a higher level of interactivity implies greater user satisfaction and experience. Thus, guaranteeing high levels of interactivity increases the user's cognitive satisfaction (Kim et al., 2012) and influences users' overall satisfaction (Yoo, Kim, & Sanders, 2015). Therefore, Kim et al. (2012) suggested increasing the level of interactivity so that users achieve a goal easily through functions with high degrees of interactivity. Finally, STT characteristics such as interactivity have

a positive influence on travel decision support satisfaction (Yoo et al., 2017). All this leads us to explore the following hypothesis:

H4: Satisfaction in the use of the chatbot is explained by the tourist's perception of interactivity.

3. Methodology

The study involved two main objectives. The first was to find out what were the main attributes of destination chatbots (informativeness, empathy, accessibility and interactivity) perceived by tourists after a conversational session with them. The second was to find out which of these attributes influence tourist satisfaction after searching for information.

The study was based on the analysis of two tourist chatbots at two destinations in southern Spain: Victoria la Malagueña (Malaga destination chatbot) and TurismodeMurcia (Murcia destination chatbot). Each chatbot provides tourist information on its respective destination. The Victoria la Malagueña chatbot won the Chatbot Tourism Awards 2019, granted by the Spanish state society dedicated to the management of innovation and tourism technologies (SEGITTUR). It has a conversational interface on both Facebook and Google Assistant. It is accessible from a PC, iPhone or Android mobile device. Its main functionalities include generating information about: attractions, restaurants, parking lots, routes, Wi-Fi locations, weather and beaches, among others. The Murcia chatbot has similar access channels and it offers information on the main points of interest: recommended tourist routes, gastronomy, museums and theatres, information on public transport, and so on.

The research consisted of an experiment with students from Universitat Rovira i Virgili, Spain, between October and November 2019, applying the convenience sampling

technique. This non-probability, non-random sampling technique was chosen due to its accessibility and ease of operation, since we had access to participants who belonged to the population of interest. When using this technique, habits, opinions, and points of view can be observed more easily. The experiment had two phases: the first phase consisted of explaining to the participants what the chatbots were and asking them to imagine that they were at the destinations and to look for the information they might need. In the second phase, the participants had to interact with each chatbot for 10 minutes and answer some questionnaires. During that time, the participants could make inquiries about the destinations Malaga and Murcia, in terms of services, tourist activities, transportation or weather conditions at the destination, imagining that they were on vacation at those places. They even held conversations with chatbots not only on tourist topics, simulating conversations between humans (See Figure 1). After each conversational session with each chatbot, they independently filled out a questionnaire about their experience using the chatbot.

Previously, a pilot study was carried out with 25 respondents that served to make minor changes. The sample size was 468 participants, who answered the questionnaires correctly with a margin of error of $\pm 5.5\%$ and a confidence level of 95%. The collected data was organized, tabulated and analysed using the SPSS 25 and Gpower 3.1 statistical software tools.

[INSERT FIGURE 1]

The questionnaire had two blocks of questions based on previous studies. The first block contained questions about the socio-demographic aspects of the participants, the time they spend on internet entertainment, and their frequency of tourist trips. The second block measured the attributes of the STTs (informativeness, empathy, accessibility and interactivity) and satisfaction with the use of the chatbot. Statements measuring attributes

such as informativeness, accessibility, and interactivity were adapted from the studies of Kim and Niehm (2009), Lee et al. (2018), No and Kim (2015) and Pavlou et al. (2007). The empathy construct was designed by the authors from the studies of Chaves and Gerosa (2019), Paiva et al. (2017), and Zhou et al. (2020). All items were measured on a seven-point Likert scale [1 = totally disagree, 7 = totally agree]. Additionally, we also measured chatbot usage satisfaction from the studies of Lin and Hsieh (Lin & Hsieh, 2007). The satisfaction item had a seven-point Likert scale [1 = Not at all satisfied; 7 = Very Satisfied].

The data were analysed in two stages: first, factor analysis was carried out to identify the constructs that underlie the variables. Factor analysis has been widely used in tourism research (Johns & Gyimóthy, 2002). In this study, the principal axis factorization method and the promax oblique rotation method were used to facilitate data interpretation. In addition, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (MSA) was used to determine the factorability of the data (Spicer, 2005). Bartlett's test of sphericity was used to determine whether it was appropriate to perform a factor analysis. Second, the hierarchical multiple regression method was implemented to find the positive or negative predictions between the theoretical attributes of the STTs (interactivity, informativeness, accessibility, empathy) and the satisfaction in the use of the chatbot variable. In addition, the Harman test was applied to verify Common Method Variance (CMV).

[INSERT TABLE 1]

Results

4.1. Sociodemographic factor

Most participants were between 18 and 24 years old (94.5%) (Table 2). In relation to gender, 29.2% were men and 70.6% women. The time the students spend browsing the Internet in search of entertainment was: 17.1% (2 hours/day), 40.7% (3 hours/day) and 27.9% (5 hours/day). 51.8% of the participants travel for tourism once a year, followed by 22.6% who do so twice a year, with 10.2% of participants doing so three times a year.

[INSERT TABLE 2]

4.2. Factor analysis

Factor analysis was carried out as a technique for data reduction and to interpret the results with greater clarity. To obtain significant and interpretable factors, the principal axis factorization extraction method was selected, and the promax oblique rotation technique was used. The analysis was applied to the 21 statements of the questionnaire, eliminating those that could not be collected under any factor or that were associated with more than one factor. As a result of EFA, it was found that a total of 21 items formed a four-dimensional structure: “informativeness”, “empathy”, “accessibility” and “interactivity”. See Table 3.

The Kaiser criterion was used to ascertain the adequate number of factors, taking into account only eigenvalues greater than 1.00. It should be borne in mind that if the MSA value is greater than or equal to 0.8, it is considered a worthy value (Hair, Black, Babin, & Anderson, 2010), but if it is higher than 0.90 it can be considered excellent (Kaiser, 1970). In our study, the KMO value of the data was found at 0.919, therefore, an excellent value for the proposed model. In total, four factorial attributes were part of the solution and accounted for 61.7% of the total variance explained. Cronbach’s alpha of the factors ranged between 0.934 and 0.698, which suggests high internal consistency among the variables underlying the factor. The factor loadings exceeded the critical value of 0.50

suggested by Hair et al. (Hair et al., 2010). Finally, Bartlett's test of sphericity measures the existence of significant correlations between the variables (Hair et al., 2010). To affirm a sufficient relationship between the variables, Bartlett's test must produce statistically significant results. ($p \leq 0.05$) (Hair et al., 2010). Test results indicate that the data is adequate for EFA ($\chi^2 = 6552.089$; $p < 0.001$)

[INSERT TABLE 3]

The results of this table respond to the first objective of the study that is to find out which are the main attributes of the chatbots perceived by tourists during a conversational session. As shown in Table 3, the most highly valued factor or attribute in the model is "Informativeness", which refers to the useful, appropriate and relevant information provided by the chatbot. This factor included 38.29% of the total explained variance. The second factor, ranked in order of importance is "Empathy", which refers to the ability of the chatbot to generate emotionally empathic responses. This factor accounted for 13.28% of the variance. The third factor valued was "Accessibility", which refers to the ease of using and accessing the chatbot at any time and place. This factor included 6.37% of the total explained variance. Finally, the fourth factor was "Interactivity", which refers to the response time of the chatbot to the user, as well as the ease of sharing information with other users. This factor comprised 3.78% of the total explained variance.

4.3. Common Method Variance (CMV)

The Harman single-factor test, for common method variance (CMV) was applied when entering all the items of the constructs in the EFA. The result was a multifactorial solution, where the first factor explained 40.01% of the total variance, that is, it is unlikely that the CMV is an inconvenience (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Therefore,

it can be inferred that there is no methodological bias and that the collected data is ready for further analysis.

4.4. Attributes of Smart Tourism Technologies that predict satisfaction in the use of the chatbot

To find out if the levels of satisfaction in the use of a tourist chatbot are predicted by the theoretical attributes of STTs (informativeness, empathy, accessibility and informativity), a step-by-step multiple regression was carried out. According to Table 4, the regression model was significant in the F-test ($p = 0.001$). It did not present collinearity problems (tolerance > 0.2 ; VIF < 10), and independence between the residuals could be assumed (Durbin–Watson = 1.480).

Among the results, a significant positive correlation ($p = 0.001$) was found between the informativeness construct and chatbot usage satisfaction, which means that tourists who perceive that they receive useful information (INF4), sufficient for their needs (INF 5) and relevant to the information sought (INF6), have a higher level of satisfaction with the use of the chatbot. These results confirm H1. Consequently, it can be affirmed that informativeness predicts satisfaction in the use of destination chatbots.

In addition, a positive and significant correlation ($p = 0.001$) was also identified between the empathy attribute and chatbot usage satisfaction. It was found that the responses of chatbots with an emphasis on emotions, which can make users smile (EMP3), influence satisfaction in the use of the application. It was also observed that the responses of chatbots that contain affective or emotional expressions (EMP5) generated greater satisfaction in their use. All these results corroborate H2. Therefore, it can be affirmed that the greater the tourist's perception of empathic responses in a human-machine conversation, the greater their satisfaction with the use of the chatbot.

Likewise, a correlation, albeit negative, was found between the accessibility attribute and chatbot usage satisfaction. Interestingly, the ease of the application interface (AC2) does not predict satisfaction in using the chatbot. But even more surprising is that logging in at any time (AC4) or place (AC1) does not bring user satisfaction. This result rejects H3. Therefore, it can be affirmed that greater perceived accessibility in the use of chatbots will generate less satisfaction among tourists.

Finally, a positive and significant correlation ($p = 0.001$) was detected between the interactivity attribute and chatbot usage satisfaction. Thus, response speed (INT1) to user requirements; answering all the questions the user asks (INT2) and sharing information through the chatbot (INT3), predict satisfaction. It was observed that responding quickly and consistently to inquiries, as well as the ease of sharing information with other users during an interaction, predicts chatbot user satisfaction. This corroborates H4. Therefore, it can be affirmed that greater perceived interactivity in the use of destination chatbots predicts greater tourist satisfaction.

[INSERT TABLE 4]

4. Discussion

The results of the attributes of STTs (informativeness, accessibility, empathy and interactivity) present in the existing literature (C. D. Huang et al., 2017; No & Kim, 2015; Pai et al., 2020) on destination chatbots indicated that informativeness, empathy and interactivity were key factors in explaining and predicting tourists' satisfaction with the use of chatbots. However, accessibility was not a factor that predicted satisfaction. These results contradict previous studies that showed that accessibility in digital platforms generating electronic word of mouth arouse satisfaction (da Costa Liberato, P. M., Alén-González, E., & de Azevedo Liberato, 2018) and create a positive influence on travel

decisions (Yoo et al., 2017); or that perceived accessibility in STTs increases tourists' overall travel quality (Perdue, 2002). They also contradict the study of Pai et al. (Pai et al., 2020) that showed that accessibility was the most important factor affecting tourist satisfaction. However, these results are along the lines of a study that showed accessibility was not a primary factor for tourists to maximize a memorable experience at the destination (Jeong & Shin, 2019).

These results could be explained because the study participants belong to a young target population and are familiar with smart technologies because they grew up using them. Therefore, the use of the chatbot was already easy, accessible, and they did not require greater accessibility, especially for young people. This is in line with the results of Biswas et al. (2020) and others (Assaker, G., Hallak, R., Assaf, A. G., & Assad, 2015; Chi, 2011) that showed there is a moderate age effect on the relationship between accessibility and satisfaction. They showed that young people would not consider accessibility so important and it would not provide satisfaction to the other age groups.

Informativeness was the factor most valued by potential tourists; that is, it is the one that most influences or best predicts user satisfaction. This is consistent with the results of previous studies (Park et al., 2007; Veeramootoo et al., 2018). Thus, the quality of the information provided by the chatbot in terms of reliability, accuracy, precision and relevance increases user satisfaction in a conversational session. Therefore, informativeness becomes the most valued attribute of destination chatbots to meet the needs of tourists during their trip. These findings are consistent with the previous literature (Huang et al., 2017; Jiang & Ahuja, 2020; Yen & Chiang, 2020).

In our study, empathy was an important attribute in destination chatbots. The emotional responses of chatbots using affective expressions allowed generating feelings of trust, and impressed the user (B. Liu & Sundar, 2018). These results are also consistent with the

literature on empathy in other technological agents (Brave et al., 2005; de Kervenoael et al., 2020; Portela & Granell-Canut, 2017; Stein & Ohler, 2017). Chatbots are required to maintain a minimum level of empathy (Zumstein, D., & Hundertmark, 2017) when they respond to tourists (Alam et al., 2018).

Finally, the results also showed that interactivity is an important attribute in tourism technologies and especially in destination chatbots. In our study, response speed, immediate feedback and ease of sharing information with other users are configured as the main elements that determine interactivity in a tourist-chatbot conversational dynamic. These results coincide with the previous literature on this subject (Johnson et al., 2006; Klein, 2003). Likewise, and consistent with the findings of previous studies (Baek et al., 2019; Garrity et al., 2005; Lew et al., 2018), interactivity is an attribute that predicts satisfaction in the use of the chatbot, generating a better experience with the user. In addition, a high level of interactivity in a conversation increases the perception of humanity of systems based on chatbots (Go & Sundar, 2019), on behavioural intentions and on positive attitudes (Yang & Shen, 2018), as well as in the perception of the quality of service (Cho, Lee, & Yang, 2019).

5. Conclusions

One of the main theoretical contributions of our study is that it shows that empathy in the responses of destination chatbots is one of the main attributes to generate satisfaction among tourists. It corroborates that empathy is indeed a key attribute of destination chatbots and that empathy should therefore be incorporated as one of the attributes of the STTs to be analysed in chatbots.

Another theoretical contribution is the revelation that young people are not particularly satisfied with the accessibility of chatbots, because these technologies are already

sufficiently accessible to them. It also highlights the need for further studies on the accessibility of the different STTs by different age groups.

Moreover, the study's main contribution to management-related aspects is that it demonstrates which of the attributes of destination chatbots generate satisfaction for tourists: informativeness, empathy and interactivity. This information is of special interest to chatbot architecture designers and to DMO managers, who must foster these attributes in destination chatbots.

As the study demonstrates the importance of creating empathetic destination chatbots to generate greater satisfaction among tourists, empathy must be taken into account by chatbot designers as one of the key attributes in the creation of these smart technologies also in the field of destinations. So, it is recommended to increase chatbots' levels of empathic response in order to increase satisfaction with their use. It is even advisable to improve this attribute especially for users who do not believe in robotic intelligence or robot's ability to display emotions (Liu & Sundar, 2018).

Similarly, chatbot architecture designers and DMOs must take care of informativeness in the destination chatbots, due to the satisfaction it generates in communicating with the tourist.

Finally, it is suggested to increase destination chatbot interactivity so that modern tourists can obtain information about the destination easily and with high levels of interactivity. Furthermore, chatbot designers should aim to sophisticate the degree of contingency in human-machine interaction, to strengthen the "message interactivity" theory and thereby further humanize systems such as chatbots.

Designers of chatbots and managers of DMOs should also take into account the negative results of young people's satisfaction with the accessibility of chatbots, in order to explore

new technologies and improve the accessibility of chatbots in a different way, oriented towards the younger population.

The main limitation of the present study is that the participants in the experiment were mostly young people under 24 years of age. Although it is a key target population for the study, it would also be interesting to discover the interests, behaviours and opinions of other age groups. Moreover, the study focuses on Spain and it would also be interesting to find out about chatbot uses and satisfaction in other countries.

Future research could also expand on the impact of STT attributes and analyse their influence on tourists' intention to visit or on the image of the destination. It would also be interesting to analyse the chatbots of other destinations with similar characteristics and compare the results in relation to their ability to respond empathically; and expand the study sample to other age groups and other countries to see if there are differences in user satisfaction due to age or cultural differences.

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