Satisfaction and performance expectations for the adoption of the metaverse in tourism SMEs

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A R T I C L E   I N F O

A B S T R A C T

The last decade has seen major transformations in the tourism sector, influenced by changes in consumer behaviour and the integration of technology. The Metaverse has emerged as a transformative force but with certain limitations. In this sense, the literature highlights the need to address research gaps in terms of the levels of acceptance of this new technology and with regard to the challenges faced by small and medium-sized enterprises (SMEs) in the tourism sector. Thus, the main objective of this paper is to assess the adoption intention of high technology in tourism by small and medium-sized enterprises, focusing on the key role of the Metaverse as a new paradigm. For data collection, a total of 172 small and medium-sized enterprises have been surveyed using a double methodology, PLS-SEM and QCA, for the analysis. The results show that small and medium-sized tourism enterprises intend to adopt technologies associated with the Metaverse for the concept of Business Satisfaction rather than for the possible performance it may represent. These results represent an important advance in the understanding of the integration of Metaverse technologies in the tourism sector in this type of companies, where it can help to adopt diverse strategies in the business environment without having an excessive Resistance to Change, helping to be able to face it in conjunction with other capabilities.

Introduction

In recent years, substantial transformations have been implemented in traditional sectors such as tourism (Karaca & Baran, 2024), these developments are not only due to the change in consumer behavior when it comes to choosing destinations (Khan et al., 2024), and generational changes (Morrone et al., 2024), but the latter have been a complement so that the technology can be established and sustainable over time in this sector (Gonzáles-Santiago et al., 2024). In this sense, and over time, we have witnessed an exponential growth in the adoption of high technology (de Lurdes Calisto & Sarkar, 2024), where the concept of the Metaverse has been key to establish a new paradigm whereby users have the opportunity to immerse themselves in an alternative virtual reality, taking advantage of a virtual environment without having to leave their own homes (Ghali et al., 2024). The Metaverse is emerging as a transformative agent in the tourism industry, altering the way in which

customers make decisions regarding the choice of accommodations and destinations to visit (Karaca & Baran, 2024). It is anticipated that this technology will have a revolutionary impact on the management and marketing of tourism companies, influencing all phases of the trip, from pre-planning, through the experience itself, to the end of the trip (Buhalis et al., 2023).

However, all this technology comes at a cost of implementation, promotion and structural changes (Rohit et al., 2024). It is undeniable that large companies are investing in this concept (Hadi et al., 2024) and, therefore, the scientific community tries to explain their evolution when they incorporate the Metaverse into their operations (Bao et al., 2024; Kang & Ki, 2024), but there is no denying that the Metaverse has certain limitations (Mkedder & Das, 2024). Among the limitations posed by the adoption of the Metaverse is the issue of how these innovations will be adopted by small and medium-sized enterprises. There is a notable increase in public investment for the adoption and integration of companies into digital technologies within the EU framework, especially in the regulation of Metaverse systems. However, there is a gap in research on how to develop policies related to the operability of SMEs in the adoption of immersive

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technologies. This research aims to fill the gap concerning the reality of tourism SMEs and their considerations regarding their resources and capabilities. Thus, there are several publications of a conceptual nature, highlighting the importance of the Metaverse in the tourism industry (Buhalis et al., 2023; Gursoy et al., 2022) that invite to cover, among other aspects, the research gap in relation to the level of acceptance and the challenges in the adoption of the Metaverse in the tourism industry. This is why, in the literature, we find works such as that of Gil-Cordero et al. (2023) where the intention to use the Metaverse by small and medium-sized companies is examined. But it would be interesting and significant to extend this study to find out whether small and medium-sized companies in the tourism sector are willing to use this new technology, despite the structural changes and economic challenges that it entails for these types of organizations with limited resources (Urbano et al., 2024).

Therefore, the main objective of this manuscript is to evaluate the inclination of small and medium-sized enterprises toward embracing advanced technology within the realm of the tourism industry, focusing on the key role of the Metaverse as a new paradigm. In order to establish the framework of the research, small and medium-sized companies working and operating in the tourism sector in the territory of one of the main tourist powers - Spain- have been asked questions (Más-Ferrando et al., 2024; Rodríguez-Vázquez et al., 2023), taking into account key constructs such as Business Satisfaction (BS), Performance Expectancy (PE) and Behavioral Intention (BI). In the tourism sector, the adoption of virtual reality technologies can ensure successful tourism offerings (Yung & Khoo-Lattimore, 2019) and the recent literature has linked Business Satisfaction with the adoption of technology, such as Metaverse systems, in the field of tourism (Flavián et al., 2021; Marasco et al., 2018; Wei, 2019).In this sense, the analysis of behavior linked to technology adoption highlights the crucial importance of Business Satisfaction (Almaiah et al., 2022; Kosiba et al., 2022). This factor is considered one of the most influential in understanding the willingness of companies to use a specific technology (Atiyah et al., 2023; Vărzaru et al., 2021). Perceived Compatibility plays a significant role in Performance Expectancy, underscoring the relevance for companies to assess the fit of Metaverse technology with their SME structures, given the limited resources available to these types of companies (Gil-Cordero et al., 2023). In this vein, and taking into account the adaptive capabilities of SMEs and the compatibility they may have with a small structure to adopt the Metaverse, the Performance Expectancy is a construct that should be taken into account, since it positively affects the intention to adopt Metaverse platforms where this fact has been verified in large companies (Lee et al., 2023). Finally, considering the difficulty of gauging tangible actions in the realm of advancing technologies, it becomes imperative to rely on a construct linked to Behavioral Intention as a signifier and indicator of conduct in virtual settings (Aburbeian et al., 2022). To sum up, previous research emphasizes the close connection between the success of a technology and the willingness to adopt and employ it, as highlighted by Faqih (2022). Consequently, all the aforementioned factors will be considered in evaluating the inclination of small and medium-sized enterprises in the tourism sector to engage with the Metaverse.

The results of this research show that tourism companies intend to adopt technologies associated with the Metaverse through the concept of Business Satisfaction rather than for the possible performance it may represent. This variable influences both directly and through the expectation of performance to create the intention in tourism companies, explaining a high percentage of their behavior, and demonstrating a strong combinative capacity with other variables. Perceived Usefulness appears in all the proposed solutions, as well as Resistance to Change, although the latter is not a direct influence. The introduction of a new technology in the tourism sector could lead one to think that the Performance Expectancy could be significant. Yet this is not the case, so companies in the sector seek to feel comfortable and integrate processes that may be aligned with their practices and therefore allow a correct development.

For the development of the study we will follow the following structure: after this introduction we will present the related hypotheses and the proposed model, in the third section we will explain how the data collection was carried out, in the fourth section we will analyze the data and results and verify the hypotheses previously presented, and in the fifth section we will set out the discussion, ending with the conclusions drawn from the research.

Literature review

The Metaverse is defined as the new era of the Internet, which utilizes virtual reality devices, interactive avatars, augmented reality technology and blockchain technology within a three-dimensional virtual environment (Dwivedi et al., 2022). The influence of immersive technology has become increasingly evident in various social spheres, at the same time that the tourism industry has turned its attention to Metaverse systems (de Lurdes Calisto & Sarkar, 2024; Gegung, 2023; Lim et al., 2024). However, although these platforms have been available since the early to mid-2000s with a large number of users worldwide, in the context of the Metaverse they are limited in their independence and functionality (Comprehensive Technological Research, 2022). The constant presence of technological innovations in the tourism industry is essential, as they are required to adjust to the changing demands of users and provide them with high levels of satisfaction (Sánchez Calero et al.,2021), in addition to offering the possibility of modifying the business models of tourism companies (Tajeddini et al., 2017). Therefore, despite the challenges presented by the technological adoption of the Metaverse, businesses continue to explore the opportunities it presents to create tourism experiences that overcome physical constraints (Gössling & Schweiggart, 2022). Within the travel industry, the Metaverse opens doors to improve travel planning and advance interaction with tourism experiences. Virtual experiences in this sector are gaining popularity as a growing trend (Gursoy et al., 2022). According to Buhalis et al. (2023) the Metaverse has the potential to radically transform the tourism industry and it is anticipated that, rather than supplanting it, a virtual exploration of tourist destinations will motivate people to take real trips (Gursoy et al., 2022; Rauschnabel, 2022) and even encourage entirely new travel experiences (Go & Kang, 2022).

It is therefore necessary to carefully examine the willingness of SMEs tourism enterprises to adopt Metaverse systems so that companies can adjust their service offerings effectively (Yoo et al., 2023). In the tourism sector, the Metaverse is a technology that can offer high-value tourism proposals (Yung & Khoo-Lattimore, 2019). Previous researchers have highlighted the importance of examining the uptake of immersive technology in the tourism sector (Flavián et al., 2021; Marasco et al., 2018; Wei, 2019), as although the integration of technologies such as the Metaverse into the tourism industry can offer significant advantages (Maythu et al., 2024), companies face difficulties in making decisions on the adoption of innovations or new technologies. This is because of the need to consider various factors that may influence the decision (Yang & Wang, 2023).

From the approach to the adoption of the technology necessary for the implementation of Metaverse systems in tourism companies, Business Satisfaction (BS) (Mazzarolo et al., 2021; Tawafak, et al., 2021; Wu et al., 2014) and Performance Expectancy (PE) (Collado & Evans, 2019) are key constructs for analyzing the Behavioral Intention of companies (BI) (Soliman et al., 2019; Vărzaru et al., 2021). In addition, the Ease of Use of technology (EU) (Yilmaz, 2016) and Perceived Usefulness (PU) (Abdullah et al., 2016) are crucial aspects that indicate the simplicity with which a company can incorporate new technology and the extent to which it is anticipated to improve its performance (Grover et al., 2019). In line with the ideas of Yilmaz (2016), and in the context of the focus on technology adoption crucial

to Metaverse systems, it is highlighted that small and medium-sized tourism businesses are influenced in their behavior by the ease with which they can use Metaverse-related technology. Another important factor for technology adoption is Resistance to Change (RC) in that it has been inversely related to Business Satisfaction in studies such as that of Lyu et al., (2023). The notion of Resistance to Change can obstruct the overall process of change within companies, delaying the start of the change process and impeding its implementation or raising its cost in relation to technology adoption as will be developed below.

Last but not least, factors such as Perceived Compatiblity (PC) (Al-Sharafi et al., 2023), Social Influence (SI) (Gao et al., 2015; Pelegrin-Borondo et al., 2017) and Effort Expectancy (EE) (Venkatesh et al., 2003) are constructs identified as significant in the literature for the adoption of a new technology within small and medium-sized companies in the tourism sector in terms of their Performance Expectancy (Al-Sharafi et al., 2023; Bretos et al., 2023; Cheng et al., 2022). Performance Expectancy refers to the perception that a certain behavior will lead to the achievement of specific outcomes (Ojiaku et al., 2024), which will influence the likelihood that a company will allocate its resources and strive to reach that particular goal (Diana et al., 2024). Both, Performance Expectancy and Business Satisfaction are important variables for understanding the Behavioral Intentions of tourism SMEs in relation to technology adoption.

To recapitulate, given the importance of the analysis of Metaverse technologies and the small and medium-sized tourism enterprises (Buhalis et al., 2022, 2023) the objective of this research is to enhance the comprehension of the factors implicated in the process of adoption of the Metaverse by small and medium enterprises in the tourism sector, for which we will develop the theoretical model as follows.

Business satisfaction

In a setting where the adoption of new technologies is embraced, the pivotal concept influencing Business Satisfaction is the Perceived Usefulness and Ease of Use (Tawafak et al., 2018). In this scenario, Wu et al. (2014) propose a definition for Business Satisfaction, describing it as a comprehensive assessment undertaken by a company during the implementation of a new technological system.

The primary focus of Business Satisfaction is to address the question of how content companies are with the procedure of integrating a new Metaverse technology (Almaiah et al., 2022; Kosiba et al., 2022), as it is considered to be one of the most influential factors explaining the willingness of companies to use a given technology (Atiyah et al., 2023; Vărzaru et al., 2021). In this regard, the Technology Acceptance Model (TAM) developed by Davis, Bagozzi and Warshaw in 1989 (Davis et al., 1989) is a theory of information systems that explores how companies adopt and use new technologies. According to TAM, the acceptance and use of a technology is determined by several factors.

Among these factors is Perceived Usefulness. This factor refers to the degree to which the company believes that the use of a particular technology will improve business performance (Abdullah et al., 2016). That is, it is the company's perception of the benefits it will derive from using the technology. Perceived Usefulness is a key antecedent of Business Satisfaction, since if a company perceives a technology to be useful, it is more likely to generate Business Satisfaction (Rachmi et al., 2023). As to the adoption of the Metaverse, authors such as Al-Adwan et al., (2023) have linked Perceived Usefulness and Satisfaction, and, specifically in the tourism sector, recent researchers have measured Perceived Usefulness in the adoption of Metaverse systems (Corne et al., 2023; Jo, 2023; Wu & Yu, 2023).

On the other hand, also among these factors is Perceived Ease of Use. This factor refers to the degree to which the company believes that using a particular technology will be easy and effortless

(Venkatesh & Davis, 1996). If the company's users perceive a technology to be easy to use, they are more likely to adopt it and be satisfied with it (Warsono et al., 2023). Within the technology adoption framework, Perceived Ease of Use emerges as a crucial element reflecting the simplicity with which firms can employ new technology and the extent to which they anticipate that technology will improve their performance (Grover et al., 2019). Immersive technologies are seen as persuasive tools capable of influencing behavior and Business Satisfaction (Suh & Prophet, 2018). In this sense, several studies have focused on analyzing how the satisfaction of business users can be modified by the immersive sensation of immersive technology (Chua et al., 2007; Georgiou & Kyza, 2017; Kourouthanassis et al., 2015)

It is important to note that the TAM model has undergone updates and expansions over time, such as TAM 2 and the Unified Theory of Acceptance and Use of Technology (UTAUT). These updates have allowed the model to be adapted to different contexts, including the technological adoption of the Metaverse (Alkhwaldi, 2023), where additional factors such as Trust, Perceived Risk in the use of a system and Resistance to Change have been considered (Kumar et al., 2023; Pillai et al., 2023).

The concept of Resistance to Change can hinder the overall change process within companies (Jang et al., 2023), slowing down the initiation of the change process and hindering its implementation or increasing its cost in relation to technology adoption (Gani et al., 2023). Resistance to Change has been studied in the tourism sector (Kim et al., 2023) as it is a reflection of the values and behaviors that can affect companies' technology adoption (Ronaghi & Ronaghi, 2022) and because of the particularities of the tourism sector in relation to technological change (Yoo et al., 2023). Resistance to Change has been inversely related to Business Satisfaction in studies such as that of Lyu et al. (2023) in relation to the technological adoption processes and specifically in the adoption of Chatbot in the tourism sector (Calvaresi et al., 2021).

Following the above, we establish the following hypotheses:

H1: Perceived Usefulness directly and significantly affects the Business Satisfaction of tourism SMEs in relation to the adoption of Metaverse technologies.

H2: Ease of Use directly and significantly affects the Business Satisfaction of tourism SMEs in relation to the adoption of Metaverse technologies.

H3: Resistance to Change inversely and significantly affects the Business Satisfaction of tourism SMEs in relation to the adoption of Metaverse technologies.

Performance expectancy

Perceived Compatibility is the perception of companies that the way they operate and the adoption of a new technology will coincide (Wu & Yu, 2023). Perceived Compatibility can have an interaction effect on performance expectancies (Wang et al., 2017), It is therefore important for companies to know if the Metaverse technology is compatible with their SME structures (Gil-Cordero et al., 2023). In the literature we find Compatibility as a significant construct for the adoption of a new technology within small and medium-sized enterprises (Al-Sharafi et al., 2023). At the same time, a significant absence is found in the literature in the study of the compatibility of Metaverse adoption in the tourism sector, taking into account Performance Expectancy, where Perceived Compatibility implies the company's acceptance that the technology is compatible with its background (Akour et al., 2022).

On the other hand, Effort Expectancy is defined as the degree of ease associated with the use of the system (Venkatesh et al., 2003). Several studies consistently show that Effort Expectancy is a predictor of intention to use the technology (Alwahaishi & Snásel, 2013;

Kohnke et al., 2014). It is also a construct linked in the literature to the study of new technologies applied to tourism (Bretos et al., 2023). It has sometimes been associated with different models of acceptance, which have been discussed in the literature, where it is proposed that the study of the Metaverse must go beyond and disassociate from traditional models (Pal et al., 2023). For example, Kohnke et al. (2014) confirm that Effort Expectancy is an important predictor of the acceptance of emerging systems. On the other hand, and along the same lines Kaluarachchi (2023), shows that the Effort Expectancy and outcome have a significant positive relationship.

With regard to Social Influence, this is defined in the literature by Venkatesh et al. as the influence that people who are important to a company have on the decision to use a new system (Venkatesh et al., 2003). Social Influence has been found to have a positive relationship with the intention to use a device (Gao et al., 2015; Pelegrin-Borondo et al., 2017). The literature has related the Performance Expectancy to the Social Influence on the adoption of new technologies (Cheng et al., 2022), but there is a lack of adoption of new technology in the tourism sector.

Finally, Satisfaction and Performance Expectancy have been studied together in the literature. (Abd Aziz et al., 2023), with Performance Expectancy being a dominant variable in the adoption of new technology with satisfaction in mind, as noted in the TI literature (Amin et al., 2022). Therefore, we formulate the following hypotheses:

H4: Perceived Compatibility directly and significantly affects the Performance Expectancy of tourism SMEs in relation to the adoption of Metaverse technologies.
H5: Effort Expectancy directly and significantly affects the Performance Expectancy of tourism SMEs in relation to the adoption of Metaverse technologies.
H6: Social Influence directly and significantly affects the Performance Expectancy of tourism SMEs in relation to the adoption of Metaverse technologies.
H8: Performance Expectancy directly and significantly affects the Business Satisfaction of tourism SMEs in relation to the adoption of Metaverse technologies.

Behavioral intention

The need to develop an innovative research approach and paradigm for assessing the integration of the Metaverse into the business environment is gaining increasing importance in critical terms (Gil-Cordero et al., 2023; Han et al., 2022; Suh & Prophet, 2018).

The concept of Behavioral Intention pertains to a company's readiness, demonstrated by its exertion and deeds, to implement a particular course of action. (Bajunaied et al., 2023; Mukherjee et al., 2023). Earlier studies have emphasized that the success of a technology is intricately connected to the inclination or willingness to utilize it, as underscored by Faqih (2022). Existing research suggests a robust correlation between the intention to act and the subsequent behavior (Gansser & Reich, 2021; Moriuchi, 2021). Moreover, it highlights the association of the Behavioral Intention with the effective growth and advancement of a novel technology within the business landscape (Gunawan & Gunawan, 2019).

Research, such as that of Sánchez Calero et al. (2021), argues that the continuous integration of technological innovations is fundamental in the tourism industry. These innovations are considered indispensable to adjust to the changing demands of users in the business and to guarantee them a high level of satisfaction during their experience (Buhalis et al., 2023). In the tourism sector Performance Expectancy has been related to Behavioral Intention, considering the value placed on virtual reality applications (Yoon et al., 2021), as well as for the adoption of new technologies by companies (Hermawati et al., 2023; Tajeddini et al., 2017).

In addition, Business Satisfaction is a pivotal factor in the examination of behavior concerning technology adoption, as it stands out as one of the most influential factors clarifying the inclination to utilize a particular technology (Almaiah et al., 2022; Atiyah et al., 2023; Kosiba et al., 2022). It is postulated that the evaluation of success in the incorporation of new technologies by companies should be based on the synergy between the implementation of human, technological and strategic resources to speed up improvement processes and boost profitability margins. Earlier research has identified a correlation between satisfaction and the inclination to adopt new technologies, particularly when there is awareness of their existence (Mitroulis & Kitsios, 2019) or by virtue of prior encounters with technology. This subject of investigation has gained insights and familiarity (Cimbaljević et al., 2023; Pappas et al., 2021). Within the domain of virtual reality, the exploration and cultivation of skills for engaging with the environment manifest themselves through interactive functionalities, providing companies with the means to investigate and exert an influence on the constructed surroundings (Sutcliffe, 2016). Business Satisfaction therefore relates to the extent of alignment between anticipations and the ultimate perception of the benefits disclosed following the adoption of the Metaverse (Mazzarolo et al., 2021).

Within the tourism sector, ongoing surveillance of Business Satisfaction emerges as a pivotal factor for success in a fiercely competitive market. This surveillance mirrors the capacity to fulfill the expectations, wishes, and objectives initially established by the company members concerning the original perception of the provided tourism service (El Archi & Benbba, 2023; Ezzaouia & Bulchand-Gidumal, 2023).

Building upon the aforementioned points, the following hypotheses are posited:

H7: Performance Expectancy directly and significantly affects the Behavioral Intention of tourism SMEs to adopt Metaverse technologies.
H9: Business Satisfaction directly and significantly affects the Behavioral Intention of tourism SMEs to adopt Metaverse technologies.

The model proposed for this research is presented in Fig. 1:

Methodology

Sample and data collection

For the elaboration of the research, the present work developed a questionnaire and applied an empirical study using Spanish tourism companies according to their categorization by the National Institute of Statistics (INE), and through the National Classification of Economic Activities (CNAE), specifically the companies associated with group 79 (Tourism activities), carrying out a representative sample of these. The list of extracted companies was of 409 companies, which were previously contacted through their CEOs or development managers to determine their knowledge about the Metaverse, and the options that this technology can offer in the tourism field. For convenience, a type of sample selection is carried out that does not follow a probabilistic pattern. This way of choosing implies that each of the elements in the population does not have the same opportunity to be chosen and depends entirely on the researcher's criteria. Its use is very common in disciplines such as social sciences and business, given that the diversity in the possible characteristics of the elements studied requires establishing guidelines for the research (Liao et al., 2019). In our case, the choice of this non-probabilistic modality is based on the need for companies to understand the Metaverse concept and their favorable disposition toward its use (Gil-Cordero et al., 2023), Therefore, the interviewees were contacted beforehand to learn about their knowledge of Metaverse technologies and their
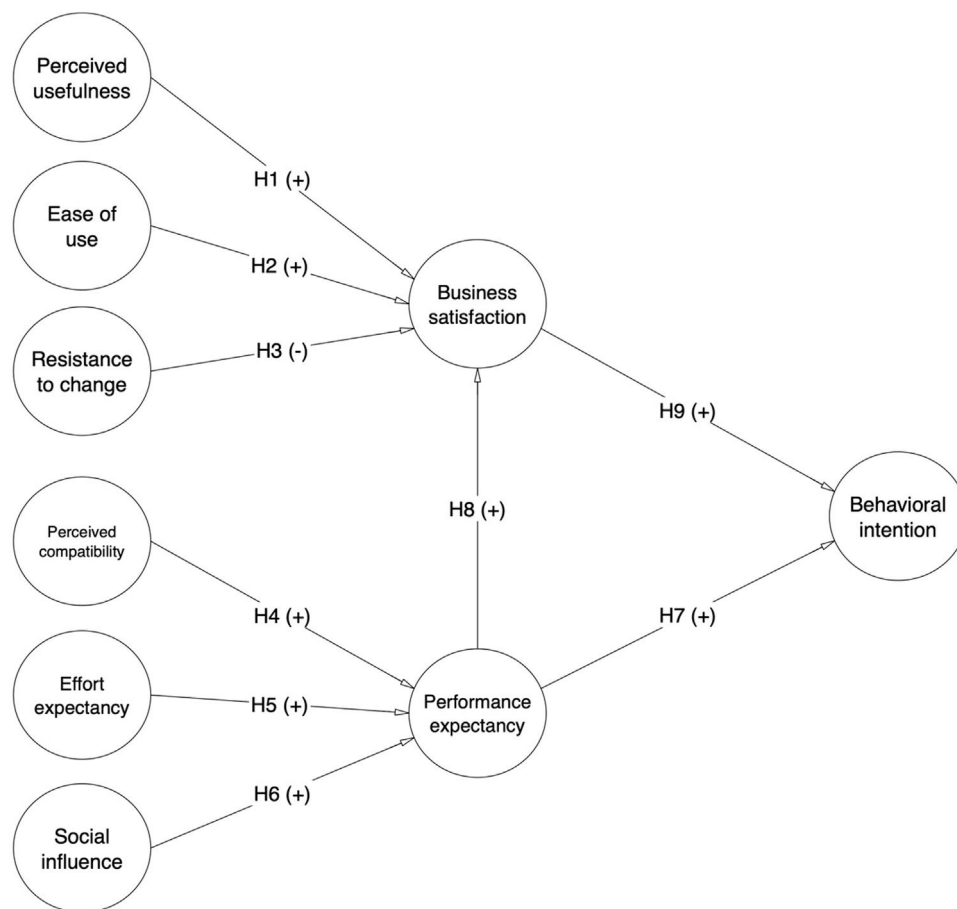
Fig. 1. Proposed model

Table 1
Sample characteristics

Departments	
Presence of Digital Department	40.2 %
Presence of Marketing Department	56.1 %
Territorial representation	
Rural and inland tourism	16.4 %
Northern beaches	17.9 %
Levante beaches	21.5 %
Southern beaches	23.8 %
Island companies	15.6 %
Other tourism companies	4.8 %

willingness to participate in the study, prior to sending the questionnaire. The questionnaires were then sent via a specific platform for self-administration. The research was done between October and December 2023. Finally, the valid questionnaires received amounted to 172, rejecting those that were incomplete or did not have adequate knowledge of Metaverse technologies. This represents a response rate of 42.05 %.

The composition of the sample of companies can be seen in Table 1. In order to analyze the perspective of Metaverse development in tourism companies and their conception of it, the research analyzes both the presence of a digital and a marketing department in the analyzed tourism companies. The data show that 56.1 % and 40.2 %, respectively, have a marketing and digital department. In addition, within the non-probabilistic methodology and to ensure territorial representativeness and the generalization of the results,

the sample is composed of companies representative of the main Spanish tourist areas.

Measurement of variables

The application of the scales on companies means that in the present study we have selected those scales already tested on companies, and derived from previous studies on technological behavior and adoption. Thus, the Perceived Usefulness and Ease of Use scales are adapted from Davis (1989). Resistance to Change is analyzed by means of the scale of Alaiad et al. (2019). For the variables Effort Expectancy, Performance Expectancy and Social Influence, adaptations of the scales of Venkatesh et al. (2003) are used, and Perceived Compatibility is extracted from Moore and Benbasat (1996). Behavioral Intention is an adaptation of Taylor and Todd (1995). Business Satisfaction is a construct previously used in studies on the adoption of Metaverse technologies (Gil-Cordero et al., 2023), and is adapted from the work of DeLone and McLean (2016). A seven-point Likert scale was used for all the variables, with 1 being total disagreement and 7 total agreement. The questions asked in the different constructs can be seen in Table 2.

Linear and non-linear approach

Regarding the tools employed, this study merges both linear and nonlinear strategies for two fundamental reasons. For the evaluation of the hypothesized relationships, we used Smart-PLS 4 (Ringle et al., 2022). The explanatory power of PLS-SEM has been demonstrated in numerous studies in various disciplines (Henseler, 2018). In the first

Table 2
Scales and constructs

Construct/Dimension/Indicator	Factor Loading	Cronbach's Alpha	Composite Reliability	Average variance extracted (AVE)
Perceived Usefulness (PU) (Davis, 1989)		0.954	0.967	0.879
Using the Metaverse will improve my business development performance	0.952			
Using the Metaverse in my activities will improve my business productivity	0.949			
Using the Metaverse will enhance the effectiveness of my business activity	0.929			
I believe the Metaverse possesses utility for my company and its growth.	0.920			
Ease of Use (EU) (Davis, 1989)		0.951	0.964	0.871
Learning how to use the Metaverse will be easy for my company	0.928			
In general, I believe that the Metaverse will be easy to use	0.931			
Interaction with the Metaverse will be flexible for my company	0.922			
Interacting with the Metaverse will be easy for my company	0.953			
Behavioral Intention (BI) (Taylor & Todd, 1995)		0.949	0.975	0.951
I plan to leverage the Metaverse for the advancement of my business operations	0.975			
My aim is to increasingly conduct a substantial portion of my business activities within the Metaverse.	0.976			
Perceived Compatibiity (PC) (Moore & Benbasat, 1996)		0.951	0.968	0.910
Using the Metaverse in my company would be compatible with my business model	0.939			
Using the Metaverse to promote or advertise my company would be consistent with my company's values	0.967			
Using the Metaverse in my company would fit with the values of my company	0.955			
Resistance to Change (RC) (Alaiad et al., 2019)		0.952	0.942	0.952
I wouldn't want the Metaverse to change the way my business is conducted	0.937			
I do not want the Metaverse to change my company's interaction with the consumer	0.969			
By assuming changes in the business methodology of my business that the Metaverse entails, I would find it easy to adapt to it.	0.901			
Effort Expectancy (EE) (Venkatesh et al., 2003)		0.811	0.886	0.721
The application of the Metaverse would be transparent and easily comprehensible for my business	0.906			
I anticipate no challenges in implementing the Metaverse within my company	0.783			
I perceive that the Metaverse could bring valuable benefits to my business.	0.855			
Performance Expectancy (PE) (Venkatesh et al., 2003)		0.736	0.850	0.663
Leveraging the Metaverse would enable me to expedite inquiries or business transactions	0.901			
Integrating the Metaverse would enhance the quality of the products or services provided by my company	0.913			
My company would have the capability to access the Metaverse from any device.	0.985			
Social Influence (SI) (Venkatesh et al., 2003)		0.949	0.975	0.951
It seems that if my company does not manage the Metaverse, it is outdated	0.855			
My consumers think I should use the Metaverse	0.911			
Business Satisfaction (BS) (DeLone & McLean, 2016)		0.936	0.959	0.888
I hold the view that incorporating the Metaverse into the business environment is valuable	0.894			
I am convinced that integrating the Metaverse could yield numerous benefits for my company	0.970			
I believe it would be worthwhile to incorporate the Metaverse into my business activities.	0.961			

instance, business decisions often exhibit variability and are highly conditioned by external and internal elements, especially in decisions related to unknown issues (Gil-Cordero et al., 2023). Second, in line with the above, this study addresses an issue with high causal complexity and prominent external social elements, which makes the combined use of both methodological strategies more likely to capture the reality of the business decision-making process (Gil-Cordero et al., 2023). Therefore, a PLS-SEM analysis approach is initially employed (Hair et al., 2019). This method will allow us to evaluate the significance of the hypotheses formulated, and, therefore, the direct relationships between the variables. However, business behavior is determined by combinations of these variables, which may even vary according to internal and external circumstances, approaching a situation of causal complexity. Subsequently, the fsQCA methodology is applied (Fiss, 2011), that makes it possible to identify all the combinations of factors that can lead to the desired outcome (Beynon et al., 2016), in this case, Behavioral Intention. The combination of both methodologies is mainly oriented to respond to the theoretical approach of complexity, which suggests that in complex situations such as business behavior, there may be multiple non-obvious causes (Schneider, 2018). Therefore, the present research contemplates the use of both techniques and the support of their results since, being an emerging field of research, both the dominant and secondary constructs and the relationships between them are not yet defined. As a result the approaches adopted will allow us to carry out a more complete analysis of the results as well as to propose better relationships for future models. In addition, an initial set of solutions is obtained, supported both by the statistical power of the hypotheses and by their presence in the

different sample elements, which delimits the conceptual framework to be developed.

Results

PLS

Measurement model

In relation to data processing, we have used the Smart-PLS 4 program (Ringle et al., 2022). Prior to this, a preliminary assessment of the reliability and validity of the measurement scales was carried out, followed by the analysis of the structural model (Chin & Dibbern, 2010). This method has received extensive validation in various academic works and has particular significance in the realm of social investigations involving limited sample sizes (Chin, 1998). On relation to the reliability of the variables, the study follows the approach proposed by Roldan and Cepeda (2017), examining the individual loadings and Cronbach's Alpha coefficient. Specifically, individual loadings are required to be greater than 0.7 and the Alpha coefficient needs to exceed 0.8 (Ringle et al., 2015). Both standards are met as detailed in Table 2. However, due to the limitations of Cronbach's Alpha coefficient, the composite validity indicators are also evaluated, which as well exceed the acceptable values of 0.8 established (Sarstedt et al., 2017). In addition, the average variance extracted (AVE) is presented to assess convergent validity, which surpasses the threshold of 0.5, considered appropriate (Ringle et al., 2015).

Discriminant validity assessment examines how distinctive a specific construct is in comparison to other constructs. Discriminant validity has been examined using the Heterotrait-Monotrait Ratio

Table 3
Heterotrait-monotrait radio (HTMT)

Constructs	PC	EE	PE	EU	SI	BI	RC	BI	PI
PC									
EE	0.797								
PE	0.817	0.749							
EU	0.662	0.797	0.683						
SI	0.547	0.646	0.749	0.340					
BI	0.815	0.678	0.672	0.626	0.563				
RC	0.407	0.800	0.654	0.677	0.325	0.275			
BI	0.817	0.814	0.832	0.554	0.516	0.773	0.352		
PU	0.836	0.762	0.817	0.597	0.603	0.719	0.357	0.812	

(HTMT) (Sarstedt et al., 2017). It has been verified that in all instances, the values are below the recommended threshold of 0.9, and even below 0.85, using a more cautious approach (Ringle et al., 2022) (see Table 3). This discriminant validity analysis indicates that constructs that theoretically should not be related do not, in fact, show a significant connection (Roldan & Cepeda, 2017). Since the reflective measurement model has demonstrated both reliability and validity, we proceed with the evaluation of the structural model.

Structural model

The model is evaluated through the path coefficients of the endogenous variables, as well as through the explained variance (R^2). For the first step, the use of bootstrapping (5,000 resamples) generates standard errors and t-statistics to assess the statistical significance of the paths and their significance (Henseler, 2018). The results and significance of the direct effects examined are presented in Table 4. Of the nine expected connections, six are supported while three are not confirmed.

The observation in Table 4 regarding the hypothesis contrasts offers us some interesting results. Companies' satisfaction in using the Metaverse is similarly determined by Perceived Usefulness (t-value 4.265) as well as Ease of Use (t-value 4.009). However, when faced with a novel technology, Resistance to Change does not appear as a determinant. With respect to Performance Expectancy, another determinant in the business world, Effort Expectancy, is the most important determinant (t-value 6.093), while Perceived Compatibility, although important, has less impact (t-value 3.224). Social Influence is not significant. We can observe these results in Table 4 and Fig. 2.

Satisfaction does determine the intention to use Metaverse technologies by tourism companies (t-value 6.614), something that does not occur with Performance Expectancy. However, Performance Expectancy has a significant impact on the satisfaction of tourism businesses (t-value 2.733). Nevertheless, it is important to note that Satisfaction also plays an important role in boosting Performance Expectancy, as indirect effects indicate the significance of the relationship (t-value 2.919).

With respect to the values of the explained variance (R^2), these can be seen in Table 5, where we can observe an explanatory level above 50 % for the final variable (53.4 %), which is high for a parsimonious model with few antecedent variables (Sarstedt et al., 2020). The explanatory results for the Performance Expectancy and Satisfaction variables also show high levels, despite having only three antecedents each.

fsQCA

The application of the fsQCA approach followed the three fundamental stages outlined by Ragin (2008): data calibration, truth table construction and logical minimization. Calibration assigns membership values to the phenomenon, shifting from a quantitative to a qualitative approach, supported by previous studies (Greckhamer et al., 2018). Ensuring precise calibration is pivotal in fsQCA to prevent inaccuracies that could compromise the validity and reliability of the outcomes. Fuzzy sets present benefits by utilizing calibration instead of measurement, assigning membership values within the range of 0 to 1 to distinct data categories (conditions and results). The precision is influenced by the selection of the calibration function and the threshold cutoffs that establish the degree of membership (Beynon et al., 2016). The algorithm provides the main statistical variables of the antecedents, as shown in Table 6.

Data calibration involves modifying the original 7-point Likert scale to create a suitable data set. This process consists of two steps: 1) calculate the mean for each construct using the responses and, 2) modify the obtained data according to the percentile of the average score for each construct. (Ragin & Strand, 2008). The outcomes of calibration are contingent upon the chosen calibration type and the selected cut-off points. In this case, we opted for the 90th, 50th and 10th percentiles, following the methodology proposed by Kraus et al. (2018). Table 6 displays the statistical characteristics of the outcomes and the preceding conditions, while Table 7 details the necessary conditions.

Following the criteria of Fiss (2011), we can determine those conditions that are necessary if the consistency exceeds the threshold of 0.9. Looking at Table 7, Satisfaction (0.9435) and Perceived Compatibility (0.9343) are considered as such and will be borne in mind later in the construction of the truth table (Pappas & Woodside, 2021). This is the next step and comprises the set of solutions that can be obtained under the possible combinations of antecedents. Through a logical minimization of combination numbers, the outcomes become mutually independent. (Fiss, 2011).

The obtained truth table (Table 8) contains the main parameters that the algorithm requires for its validity, offering three solutions for the presence of Intention to Use. Perceived Usefulness and Perceived Compatibility are present in all three solutions, thus indicating their importance in the analysis. The consistency levels of the solutions are above 0.8. Furthermore, in a more restrictive criterion, those

Table 4
Hypothesis testing He puesto puntos decimales:-

Effects of endogenous variables	Path coefficient	Confidence intervals (95 %)		t-value	Significance of the effect (P-value)
		5 % CIhi	95 % CIhi		
PU –>BS (H1)	0.481	0.275	0.720	4.265	Sí (0.000***)
EU –> BS (H2)	0.393	0.177	0.404	4.009	Sí (0.000***)
RC –> BS (H3)	-0.079	-0.265	0.185	0.679	No (0.497)
PC –> PE (H4)	0.468	0.236	0.560	3.224	sí (0.001**)
EE –> PE (H5)	0.631	0.440	0.843	6.093	Sí (0.000***)
SI –> PE (H6)	0.149	-0.021	0.307	1.803	No (0.071)
PE –> BI (H7)	0.121	-0.064	0.343	1.173	No (0.241)
PE –> BS (H8)	0.372	0.071	0.612	2.733	Sí (0.006**)
BS –> BI (H9)	0.646	0.433	0.816	6.614	Sí (0.000***)

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, ns: not significant (based on t(4999), two-tailed test).
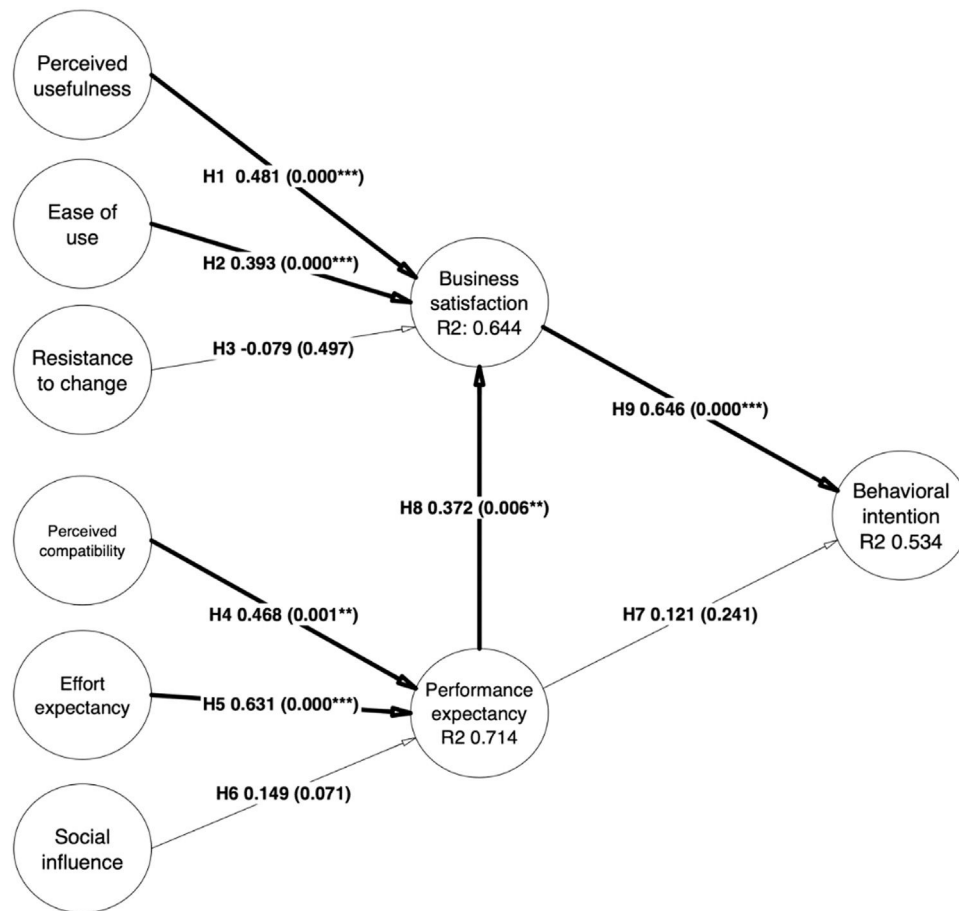
Fig. 2. Proposed model with loadings and hypothesis testing
*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, ns: not significant (based on t(4999), two-tailed test).

Table 5
Variance explained

	R^2 Ajusted
Performance Expectancy	0.714
Business Satisfacción	0.644
Behavioral Intention	0.534

Table 6
Statistics

Variable	Mean	Std. Dev.
PU	0.4500000	0.2929580
EU	0.4498780	0.2823140
PC	0.4843902	0.2960310
RC	0.4709756	0.2482751
EE	0.4618293	0.2537145
PE	0.4647561	0.2670079
SI	0.3737805	0.2544753
BS	0.5026829	0.2895204
BI	0.4084146	0.2963332

solutions whose unique coverage was above 1 % were selected (Pappas & Woodside, 2021). Overall solution coverage is at the recommended 80 % (Greckhamer et al., 2013), and the consistency is found to be 0.9622, well above the minimum of 0.75 indicated in the literature (Rihoux & Ragin, 2008), thus providing good parameters. In the present investigation, absence refers to a condition that is irrelevant to the proposed solution. As indicated by Pappas and Woodside (2021), absence and negation have been used interchangeably in the research, so that a negation also refers to the absence of the condition.

Discussion

The results obtained allow us to achieve the objectives of the study with a high level of success. However, we will now analyze the different constructs and the relationships obtained. Regarding the relationship between Perceived Usefulness and Satisfaction (H1), the results show it to be significant. This result coincides with the research of Andarwati et al. (2019) regarding SMEs' adoption of mobile technology, indicating that the results were due to the increased effectiveness of transactions that the new technology brought. Nirwanto and Andarwati (2019) also speak of the perception that tasks are completed quickly, effectively and with a high degree of ease, the relationship being also significant, as is the case in their study on the implementation of information systems in organizations. Selamat and Windasari (2021) as well highlight the positive orientation of the relationship, in a context of gradual adoption of virtual technology, such as chatbox. The presence of Perceived Usefulness in the three solutions proposed in the applied methodology speaks of the importance of the construct in the process of the identification by the companies of the technological functionality of the Metaverse, a view shared by previous studies such as that of Gil-Cordero et al. (2023). Perceived Usefulness is one of the antecedents, together with Resistance to Change, that appears as present in all solutions. In other words, Perceived Usefulness provides an enormous combinative capacity for the adoption of Metaverse technologies in tourism companies.

Table 7
Necessary conditions

	Consistency	Coverage
PU	0.882353	0.800813
~PU	0.882353	0.464080
EU	0.838459	0.761182
~EU	0.655420	0.486589
PC	0.934309	0.787764
~PC	0.582562	0.461448
RC	0.743506	0.644744
~RC	0.751568	0.580221
EE	0.827710	0.731978
~EE	0.650941	0.493995
PE	0.833682	0.732616
~PE	0.639892	0.488266
SI	0.725291	0.792496
~SI	0.751568	0.490166
BS	0.943565	0.766618
~BS	0.567632	0.466160

The relationship between Perceived Ease of Use and Satisfaction (H2) appears to be significant, indicating that companies are considering at a given moment the possible consequences of integrating Metaverse technology into their operations. The results are the opposite of those obtained in other studies on technological adoption by companies, such as those associated with mobile technology (Andarwati et al., 2019), where not even the possibility of knowledge of the technology mediated Satisfaction. Other studies related to the technological adoption of companies have shown the relationship to be significant, coinciding with the present one, such as that carried out by Lanlan et al. (2019) with respect to the introduction of new information systems, and Selase et al. (2019) in the application of networks. It is present in two proposed solutions, so it is also possible to achieve solutions without its presence, especially if the company considers Social Influence relevant.

The analysis of Resistance to Change versus Satisfaction (H3) is not significant in the present investigation. This result can be analyzed in light of other research. Prause (2019), in an analysis of 4.0 technology adoption in Japanese companies, determines the perception of Resistance to Change in aspects such as compatibility with current practices and technological infrastructures, control of production or service or organizational culture, indicating in their case that resistance to Change was indeed significant. It is possible that the lack of knowledge of the Metaverse technology does not allow companies to correctly assess all aspects. Along the same lines are the results of Khayer et al. (2020), for which Resistance to Change, in a cloud computing adoption environment is also significant. It happens that although it is not linearly significant, Resistance to Change does influence the analysis with respect to other antecedents. With respect to Metaverse technologies in tourism companies, the difficulties of change are analyzed regarding other variables, but not individually.

Perceived Compatibility and Performance Expectancy (H4) are significant in this study. In their study on e-commerce adoption, Mensah et al. (2023) speak of compatibility in terms of the technological transformation of factors, but their results are contrary to those found here, also indicating possible problems of familiarization with the technology to be implemented. However, this fact seems contrary to other research, such as that carried out on the adoption of e-governance models in enterprises by Molina et al. (2013). As for the relationship between Effort Expectancy and Performance Expectancy (H5), in the present analysis it appears as significant. This result also seems to be significant in other relationships on technological acceptance of companies, such as that of Kaluarachchi (2023), although it is true that they determine that this relationship is highly conditioned by other types of variables, such as Social Influence, although in this work they are presented as independent variables. Abu Afifa

et al. (2023), in an analysis of blockchain adoption, also found the relationship to be significant, albeit also with the condition of the existence of a high level of information. Social Influence (H6), which is not significant concerning Performance Expectancy, is a variable that is highly dependent on the type of technology adopted, as shown by Sombultawee (2020). Ramírez-Correa et al. (2019) find a significant relationship in the adoption by companies of the Internet of things. The variable appears in only one of the proposed solutions, indicating that despite its significant relationship, it is not one of the most decisive antecedents for tourism companies.

The Performance Expectancy and Intention to Use (H7), within the analysis of technological adoption among companies, is subject to greater variability. Thus, Rozmi et al. (2019) fail to demonstrate the relationship within the business adoption of information technologies, and indicate that one of the problems lies in the company's inability to visualize its operation under the new parameters. However, Gunawan et al. (2019) find it significant in the analysis carried out on the use of electronic currency between companies, something that does coincide with the results found here. In this case, the degree of congruence with past technological experience is discussed. Gil-Cordero et al. (2023) also do not find the direct relationship significant, although the mediation of Business Satisfaction makes it significant. However, the analysis of the relationship between Performance Expectancy and Satisfaction (H8) appears to be significant. Some studies emphasize the need for satisfaction on the part of the company in the acceptance of emerging technologies, such as that of Chung and Park (2021), where the relationship also appears to be positive. In fact, the relationship has also been analyzed in the opposite direction, as in the analysis of the financial performance of companies conducted by Alkhawaldeh et al. (2023), where the central value of this variable is also evident.

The relationship between Satisfaction and Behavioral Intention (H9) appears to be significant in the study. This result confirms those of an analysis on Metaverse technologies carried out by Gil-Cordero et al. (2023). Their results are also in line with those of this survey on companies, which indicate that when companies focus on immersive technology systems, they take into account the level of satisfaction they can get from them. The results are also aligned with those of Xiao and Warkentin (2021) with respect to the business adoption of information systems and the satisfaction derived from them. The importance of the Satisfaction antecedent can be observed in the third solution proposed, when the combination of its three antecedents proposed in the model constitutes a solution to achieve the Behavioral Intention.

Conclusions, implications, limitations and future lines of investigation

General conclusion

The study effectively determines the presence of tourism companies with the intention of adopting Metaverse technologies, where Business Satisfaction is a key factor in the understanding of the adoption process. This fact is relevant from a theoretical analysis perspective, since at this moment of technological evolution, the tourism company looks at itself before the adoption of this technology. Until now, most of the research has been directed toward determining the possible advantages that Metaverse technology could have for tourism companies. However, this research moves forward and establishes an initial theoretical framework of the characteristics of tourism businesses that determine their potential ability to adopt. While the implementation of these technologies can be a breakthrough, we now know that certain characteristics of tourism businesses can make or break their success. This fact also opens up an important avenue, namely the consumer's perspective on the new products and strategies that tourism companies can offer.

Table 8
Truth table

Table 8: Truth table

Solutions BI	1	2	3
PU	●	●	●
EU	●		●
RC	●	●	●
PC	●	●	○
EE	●	●	○
PE			
SI	•	•	○
BS		•	○
	●	●	○
Consistency	0.9700	0.9757	0.9588
Raw coverage	0.5989	0.5637	0.4314
Unique coverage	0.0379	0.0268	0.0737
Overall solution consistency	0.7996		
Overall solution coverage	0.9622		

Note. Black ("●") and hollow circles (" ○") show the presence and absence of a condition, respectively. Moreover, large and small circles show core and peripheral conditions, respectively. Blank cells show a "do not care" situation.

When the technologies associated with the Metaverse are in the process of development and introduction in the different processes of tourism companies, as well as in the configuration of their products and services, it is the satisfaction with the technological adaptation to their processes that guides the adoption movement. Companies are not conditioned by the Performance Expectancy, perhaps because they are still unaware of the technological possibilities, but they adopt a position of adaptation and conformity to the new technology prior to its use. Satisfaction is also determined mainly by Perceived Usefulness and Ease of Use. Previous studies have found that the presence of Resistance to Change could be a major obstacle to the development of Metaverse technologies. However, the research shows that while Resistance to Change exists, it is also a factor that enhances the company's analysis of its own characteristics, as the combination with other factors allows for a comparative analysis that encourages technological adoption. Therefore, the tourism enterprise should not be afraid of Resistance to Change but should face it in conjunction with other capabilities. The research further establishes that the advantages of adopting Metaverse technologies are not only available for one business model, but that different combinations of characteristics within the tourism enterprise can determine the same adoption outcome and even the success of its implementation.

Implications

From a scholarly perspective, the present work responds to the different calls made for research on the process of introducing Metaverse technologies in tourism companies, something that until now has been scantly analyzed (Shin & Kang, 2024). Previous analyses of Metaverse adoption, while identifying the importance of the satisfaction factor, had concluded that companies were not overly clear on why they were using the Metaverse, although they did suggest that it was an important technology (Gil-Cordero et al., 2023). This analysis contributes from a theoretical perspective to advancing on the factors of importance, setting the satisfaction element as central. The construction of future business adoption models should take these results into account. The work also determines for further research the proposal of a reorientation of the adoption models, which may be useful for future emerging technologies. This fact is reflected in the

present work by the high level of variance explained. Therefore, new technologies that are incorporated into academic analyses should take into account that the parameters of analysis established up to now can be reorganized for a better understanding of the phenomenon by researchers.

From a management perspective, this paper represents an important attempt to determine the behavior of companies in the face of the technological adoption of the Metaverse, and the possible variables that determine their behavior. Companies, at this moment, observe the Metaverse from the Utility and Compatibility Perspective, so it is necessary that they broaden their field of vision, establishing possible positive consequences of its use, and not only in immediate terms of investment and performance but as a tool for the future and the change of strategic paradigms. The research also represents an evaluation and knowledge guide for companies of the different aspects when evaluating the introduction of Metaverse technologies, establishing guidelines of knowledge of the aspects needed for their development in the company, decreasing the levels of ignorance regarding their use and results.

Tourism companies seem inclined to the adoption of Metaverse systems, as we can observe from the results and some noteworthy elements. The fact that Compatibility is significant implies that tourism agents observe congruence with respect to the technology used so far, something that can facilitate the implementation and development of new technologies. To enhance this aspect, tourism companies should look for common points with their current technologies and seek advances in the services offered but not disruptions with respect to those developed so far. This will facilitate the integration and application of Metaverse technologies. In the process of adopting Metaverse technologies, companies will encounter a certain degree of resistance depending on their characteristics and processes. The assessment of resistance should be considered in relation to the other characteristics, so companies should perform an appropriate capability assessment to determine their ability to adopt these technologies. Suppliers of Metaverse systems and technologies can find in this study a guideline to introduce their products in companies of different sectors, reducing parameters such as the effort needed for their introduction or increasing the Ease of Use.

In addition, the analysis allows the characterization of companies adopting Metaverse technologies through the solutions offered in the qualitative methodology. From a management perspective, this is very relevant for two reasons. If we analyze the vision of the company itself, it may be aware that the presence of certain characteristics makes it more favorable to the use of Metaverse technologies. The characteristics Perceived Usefulness and Resistance to Change are common to the solutions offered, so managers should not be afraid of the pressure against the changes present in the companies, but a proper analysis of internal capabilities, as well as a proper comparison of results with respect to the Perceived Usefulness of the application of Metaverse technologies means that these companies have common characteristics despite subsequently possessing a different set of capabilities. It is therefore a view of capabilities from which it would be possible to determine whether the company is closer to adoption behavior. Regarding the second reason, Metaverse technology suppliers can obtain segmentation criteria for potential customers of their technologies, knowing in advance that certain characteristics are common to all, thus facilitating the application of different distribution strategies, or even influencing the enhancement of others in order to achieve better results.

Limitations and futures lines of investigations

The results of the present research open the door for future aspects to be analyzed and developed, according to different directions. Firstly, since different combinations of antecedents in tourism enterprises can lead to the same result of adopting Metaverse

Technology, it could be questioned which characteristics are more suitable, whether it is possible to add more, and how they respond to the combination between them. This would allow an internal capability analysis to establish the initial positioning of the tourism company toward the adoption of this technology, thus decreasing a possible failure rate. We believe that this situation will be associated with an advance in knowledge about the internal and external consequences of the gradual adoption of Metaverse technology, not only in the tourism sector but also in other sectors. Subsequently, the success of the technological development of the Metaverse will depend not only on the company and its characteristics, but also on the customer, i.e., the tourist. Therefore, a clear and necessary point of research development will be the adoption behavior of the tourist.

The work is not without limitations. In the case of an emerging technology, such as the Metaverse, the parameters of technological development and expansion are not yet fully defined, so there is no global perception of its applications and capabilities. Therefore, the perceptions of companies and their managers may vary according to their own experiences and feelings about it. Further research should start from more defined and clearer technological applications for companies and respondents. Moreover, the organization of the constructs in the model responds to an early stage of the research, so that future research may determine, according to the subsequent results obtained, new organizations of the content of the constructs in an attempt to elaborate more coherent models that are closer to the reality that the Metaverse may represent in the future.

Metaverse technology appears to be multi-sectoral, capable of meeting the needs of all types of companies, although this fact does not imply that it does so to the same extent. Therefore, future research should focus on sectoral differences in the adoption of Metaverse technologies, and verify the existence of differences. On the other hand, although multiple results are obtained from a causal ambiguity perspective, it is possible that other variables may determine the entrepreneurial adoption process. Their introduction may improve the accuracy of the models. Future research can contribute to the comparison of the tourist's experience and knowledge of the Metaverse with the strategic solutions provided by the company. This could lead to a better use of resources, as the company's approaches must be aligned with those of its customers, but as this is an emerging technology, tourists still need to articulate experiences concerning this technology.

CRediT authorship contribution statement

Pablo Ledesma-Chaves: Writing − review & editing, Methodology, Conceptualization. **Eloy Gil-Cordero:** Writing − review & editing, Methodology, Conceptualization. **Antonio Navarro-García:** Writing − review & editing, Writing − original draft, Supervision, Project administration, Methodology, Formal analysis, Conceptualization. **Belén Maldonado-López:** Writing − original draft, Investigation, Conceptualization.

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