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Adopting digital reservation systems to enable circular economy in entrepreneurship

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Abstract

Purpose – In the last decade, the hospitality sector has undergone numerous changes in the organization and structure of its business models. Specifically, the adoption of new digital technologies has initiated transformative changes toward circular economy and sustainability. The present study aims to analyze whether the use of the digital reservation system in circular entrepreneurship businesses has an impact on entrepreneurs' satisfaction and trust in the in circular economy.

Design/methodology/approach – The data collected via a survey of 317 entrepreneurs who use a circular economy strategy were analyzed using SEM in a proposed model based on circular entrepreneurship businesses and the adoption of digital reservation systems.

Findings – The results showed a positive relationship between usability and perceived ease of use and user satisfaction and trust in using digital reservation systems to boost circular entrepreneurship in hospitality. Therefore, it was identified that adopting a digital reservation system can increase the efficiency of entrepreneur resources, as well as lead to creation of sustainable knowledge, augment the use of new sources of user information, improve prediction of services and demand and, consequently, boost sustainability and circular economy.

Research limitations/implications – Future research can use the results of the present study to investigate how digital technologies work and affect user trust, satisfaction, and use of these systems in entrepreneurs' projects in hospitality. In addition, it would be interesting to explore how these factors influence hospitality in different business models that support circular economy in tourism. To this end, researchers can use the variables used in the present study, along with other variables, to extend the proposed model and deepen the authors' research. In summary, this study contributes to the literature on the use of applications in hospitality sector and offer useful insight on how the adoption and use of new technologies can drive the management of knowledge and technology development, decision making and acquisition of new data sources that improve the experience of both entrepreneurs and users that interact with their services to enable circular entrepreneurship.

Practical implications – Hospitality entrepreneurs can use the results of the present study to better evaluate how using these applications can affect the communication protocols with their employees and stakeholders. Furthermore, entrepreneurs operating in the hospitality sector can use the results to develop action plans focused on the circular economy, new knowledge creation, as well as development and adoption of new digital technologies that enable circular entrepreneurship. In this way, hospitality companies will be able to effectively combine both more traditional offline channels and new technologies, such as mobile applications or the Internet.

Social implications – The authors' prediction of a strong positive link between perceived usefulness and user trust was also supported by the results of data analysis. The finding that perceived utility increases user trust in entrepreneurs when making adopting these technologies is also consistent with other similar studies. Finally, the results of this study also confirmed the hypothesized link between the perceived utility of digital technologies and user satisfaction. Taken together, the results also highlight the relevance of analyzing the use of digital reservation systems in the hospitality sector to enable circular entrepreneurship.



Originality/value – Taken together, the results highlight the relevance of analyzing the use of digital reservation systems in the hospitality sector to enable circular entrepreneurship and increase the perceived usefulness of new digital technologies so that to improve sustainable actions and the circular economy globally.

Keywords Digital technologies, Digital reservation system, Circular entrepreneurship, Circular economy

Paper type Research paper

1. Introduction

In the last decade, the hospitality sector has undergone numerous structural changes in the organization of their business models and corporate structure (Line and Runyan, 2012). The development of an increasingly dynamic and complex competition and the growth in the use of new digital technologies globally (Ambos *et al.*, 2020) has made sustainability and adaptation key pillars for success in the hospitality sector (Bramwell *et al.*, 2017). At the same time, innovation and technological development (Saura *et al.*, 2022a) have given rise to new initiatives and promising opportunities that, together with sustainability, have made the concept of circular economy one of the keys for the adoption of environment-friendly digital technologies. Broadly speaking, the concept of circular economy drives production and consumption focused on actions linked to sharing, leasing, reusing, repairing, refurbishing, and recycling of existing materials and products as a priority for companies. As defined by Cullen and De Angelis (2021), circular entrepreneurship refers to the application of circular economy strategies as a basis for entrepreneurship projects and initiatives.

Owing to the development and consolidation of globalization, global economy and the use of innovative technologies in new business models, the digitization, management of knowledge and new technologies adaptation have become increasingly important for entrepreneurs (Clauss *et al.*, 2022).

Although tourism is widely recognized as an industry that generates more income and movements around the world (Morozova *et al.*, 2019), the present study focuses on entrepreneurs' projects focused on the hospitality sector. This sector is directly linked to tourism, as both tourists and local inhabitants go to restaurants, stay in hotels and hostels and enjoy the services of similar businesses during their travels or social time. Hospitality is as a sector where, if the circular economy is consolidated as the driver of change, sustainability and strategies focused on business models that support the circular economy could drive global change toward a more circular and sustainable economy worldwide (del Mar Alonso-Almeida *et al.*, 2020; Ferasso *et al.*, 2020).

However, due to the COVID-19 pandemic, many entrepreneurial businesses have had to adapt their business models, so that to implement the use of innovative tools, resources and systems (Joo *et al.*, 2021; Breier *et al.*, 2021). The COVID-19 pandemic has provided entrepreneurs with many opportunities to adopt technologies in their businesses that would enable circular economy (Kraus *et al.*, 2020). Furthermore, the development of the hospitality sector has been based on the sustainable development goals (SDGs) proposed by the European Commission. According to SDGs (Higgins-Desbiolles and Wijesinghe, 2018), the environment has to be respected; to this end, specific rules related to sustainability, social sphere and economy are to be incorporated into entrepreneurs' projects. The adoption of digital technologies that enable circular entrepreneurship is a relevant challenge because it produces new processes and changes in the organizational projects and structures; accordingly, companies should adopt socially supportive and desirable organizational practices, as well as to understand the objectives of circular entrepreneurship (Emami *et al.*, 2021).

In this context, many entrepreneurs businesses have improved their services to add value and innovation not only to adapt themselves to the new reality caused by COVID-19 (Suchek *et al.*, 2021), but also to improve the knowledge creation in their organizations, make their

structures more flexible and implement the regular use of technologies such as Big Data (BD) analysis (Siering, 2021), monitoring of leads generated through the Internet with CRMs, digital assistants working with artificial intelligence (AI) or machine learning (ML) (Saura *et al.*, 2021a), and other initiatives that aim to increase the value of the offered services (Tse and Poon, 2015). However, previous research on the adoption of digital reservation system in circular entrepreneurship remains scarce, as this tool is an exhaustive application to enable circular economy in entrepreneurs' businesses (e.g. Tse and Poon, 2015).

A digital reservation system is a dashboard that helps the strategic management and organization of spaces and workers, which is modified by the planning and restructuring strategy that provokes anticipation and adaptation to new events or situations (Xu, 2021), makes predictions and forecasts, as well as manages the knowledge by promoting a global management of technology and a digital-based organizational culture (Saura *et al.*, 2021b). Said differently, digital reservation systems are implemented on a dashboard into entrepreneurs' projects to be personalized and adapted to any type of the business model. Then, actions such as reservations through the mobile application can be connected to the system that processes them, and it is managed by entrepreneurs to collect insights, create knowledge and predict user behavior in the medium-long term (Wang *et al.*, 2015). For instance, with the use of a digital reservation system, entrepreneurs can adequately anticipate demand without placing orders that can be thrown away (Goduscheit *et al.*, 2021; Méndez-Picazo *et al.*, 2021), reduce waste, enhance customer acceptance of sustainable actions, improve the life cycle of products, empower consumers and so forth (Pan *et al.*, 2022). In addition, entrepreneurs can promote sustainability by appropriate regulation of the temperature of spaces, send notifications about the importance of recycling, or adequately anticipate service processes to the clients. These actions will jointly promote the concept of circular economy and, if circular economy in the hospitality sector is enabled through the adoption of digital technology, this could become a key strategy to boost future circular entrepreneurship-based projects.

While these applications can help organization, sustainability and management, can they increase the number of clients if entrepreneurs promote circular economy using digital reservation systems? Will they increase clients' trust in sustainable hospitality companies? Will the digital reservation system influence entrepreneurs' trust in circular entrepreneurship? Will it improve decision making in hospitality companies that enables circular economy in this sector?

To the best of our knowledge, none of the previous studies has investigated the impact of using digital reservation systems linked to circular entrepreneurship and their influence on user satisfaction and trust. Therefore, in the present study, we aim to fill this gap in the literature to understand whether the effective use of the digital reservation systems in entrepreneurs' businesses in the circular economy has an impact on users' satisfaction (SA) and trust in the hospitality sector. To this end, we analyze the survey data using structural equation modeling (SEM) from the data collected via a survey of 317 entrepreneurs who apply a circular economy strategy. Among other variables of the proposed model, we analyzed the importance of usability, perceived ease of use (PEU), and user SA and trust in using digital reservation systems to boost circular economy in the hospitality industry.

The remainder of this paper is structured as follows. First, we review relevant previous research. Next, methodology section is presented, and the hypotheses tested in our study. On reporting the results, we discuss the findings and draw conclusions based on our findings.

2. Literature review

According to Mupfiga (2015), Information Communication Technologies (ICTs) have revolutionized the hospitality industry in the last decade. Overall, digitization and change

processes in hospitality focus on a digital medium. These digital supports are intended to put users in contact with the digital channels of companies. In this context, [Woodard \(2021\)](#) argued that, through various models of small hospitality companies, it is possible to predict the customer demand, thus favoring processes that promote circular economy owing to savings and sustainability. [Camana et al. \(2021\)](#) also concluded that management policies can provide a crucial and competitive advantage in terms of industry knowledge management, socially supportive practices, organizational management and sustainability.

Furthermore, [Pagoropoulos et al. \(2017\)](#) showed the relationship between new technologies and the circular economy. The authors identified variables that can be valuable for the transition of businesses to the circular economy and the use of technologies such as the Internet of Things (IoT) or BD, which could improve a multitude of services while saving costs and promoting sustainability. Accordingly, [Anckar and Walden \(2001\)](#) investigated how the implementation of web and new technologies in small businesses in the hospitality sector can improve the management of customers' knowledge and resources. The authors also highlighted the relevance of using digital technologies for reservation management, measure customer demand, and add value to the use of digital systems to save on costs related to poor service predictions or orders exceeding demand.

In another study, [Morrison et al. \(2005\)](#) proposed a model to evaluate digitization in tourism using various projects based on new technologies. The authors focused on the evaluation of reserve management from the past, present and future to measure the probability of success of these types of platforms. They conclude that digital systems as social media for the management of tourism agents are essential in the strategic and making-decision processes. This relation was also discussed by [Kristoffersen et al. \(2020\)](#) regarding the smart circular economy, where the adoption of digital technologies to develop the circular economy in different industries was analyzed. Following this line of research, [Elci et al. \(2017\)](#) examined the impact of the travel sector in digital channels and the implementation of systems for reservation management to analyze how users use these tools. The authors concluded that the quality of the information in these systems is negatively related to the intention of reservations using these digital systems, thus emphasizing the relevance of adopting this digital reservation system, but without linking its use to circular entrepreneurship or circular economy.

Similarly, in a study on the impact of online reservation systems, [Lin and Lee \(2009\)](#) found that online reservation systems can offer a competitive advantage to add value to the services offered by hotels in their digital strategies, distribution and logistics strategies, as well as capacity management actions, thus promoting circular economy, sustainability and resource savings. Later on, these results were also discussed by [Vargas-Sánchez \(2018\)](#). Furthermore, in a study of the application of multimedia technologies in hospitality sector, [Sigala et al. \(2000\)](#) argued that sophistication and spontaneity of digital services should be the keyway to implement them in international environments and businesses.

Moreover, focusing on the technical perspective, [Wang and Duggasani \(2020\)](#) proposed a model based on ML to estimate the demand for reservations in the hospitality sector and, in doing so, to promote logistics management and appropriate use of sustainable resources. From a different perspective, in a study that used ML to predict the range of reservations and cancellations in hotels, [Sánchez-Medina and Eleazar \(2020\)](#) found that the possibility of anticipating cancellations can provide a competitive advantage from the strategic and decision-making level. As suggested by the studies briefly reviewed above, the adoption of new digital technologies can make beneficial technical, organizational and knowledge management contributions to transition and development of circular economy businesses. Finally, it should be highlighted that, in the present study, we linked the technological adoption of this digital system to promoting circular economy and understanding its benefits for entrepreneurs' businesses ([Singhal et al., 2019](#)).

3. Methodology and hypotheses development

As discussed in the literature review, reservation management systems in the hospitality industry are a key factor that provides added value to businesses in these industries in terms of sustainability and technology development. With the help of digital reservation applications, businesses can increase their internal organization and management capacity, as well as their management of resources and services. However, none of previous studies has analyzed how the factors related to the use of such applications affect entrepreneurs' trust and SA in circular economy (Bai *et al.*, 2017), particularly with the focus on practitioners' experience as a valuable indicator to boost circular entrepreneurship.

In address this research problem, variables such as attitude toward using a digital reservation system, behavioral intention to use (BIU), perceived usefulness (PU) and PEU should be analyzed. These variables have been previously analyzed on several other contexts regarding general users' adoption (Haensel and Koole, 2011) and will be defined and linked below to entrepreneurs. In addition, we also included in our analysis the actual system use (ASU) variable. This was done to compare the current reservation system with the possible implementation of a digital reservation system that digitizes the user management process considering entrepreneurs' experience in handling the management of knowledge and technology development in their businesses (Hew *et al.*, 2016). Likewise, following Fornell and Larcker (1981) we reasoned that the study of consumer SA can result in an economic development and, consequently, great returns and risk reduction in terms of suboptimal sustainable decisions (Chen *et al.*, 2021).

Overall, the variables analyzed in the present study are used in many information sciences studies that used SEM as a methodology of analysis (Mai *et al.*, 2021). Specifically, the variables used in the proposed model were analyzed in the context of circular economy entrepreneur businesses. Therefore, attitude toward using (ATU) refers to the attitude of entrepreneurs toward the use of digital reservation systems in entrepreneurs' projects that use circular economy strategies. Furthermore, BIU refers to the level to which an individual is aware of his/her intentions of action in the near future. Next, trust refers to the degree of confidence that entrepreneurs have in the effective use and operation of digital reservation system when the business supports circular entrepreneurship. PEU refers to an entrepreneur's belief that using a particular system would be free from effort, and PU refers to the usefulness that entrepreneurs attribute to the service they are going to use (Davis *et al.*, 1989). Furthermore, SA refers to entrepreneur enjoyment of a system and the benefits that such use entails on a personal level. Finally, ASU refers to the current management system for the organization of hospitality entrepreneurs and management of knowledge and technology development as applied to their industry.

Previously, Choi *et al.* (2019) highlighted the importance of the link between the intention to use of tourism systems and the value, trust, and SA of clients when using such systems. Similarly, Li *et al.* (2019) predicted a strong correlation between the intention to use digital systems and user SA and trust. In another relevant study on tourist apps, Rezaei and Shahian (2017) confirmed the link between SA and user loyalty. Based on this evidence, the following hypothesis is formulated:

H1. SA with the use of digital reservation systems would have a positive impact on entrepreneurs' trust in circular entrepreneurship.

Furthermore, in a study on the determinants of BIU a digital system based on geolocation in the hospitality sector, Chen *et al.* (2021) investigated the relationship between the PEU of such applications and user SA. Furthermore, Alalwan (2020) investigated the acceptance of using online reservation systems in the hospitality sector. Accordingly, the following hypothesis is formulated:

H2. The perceived ease of using digital reservation systems would positively influence entrepreneur SA in circular entrepreneurship in the hospitality sector.

Next, in a study on the relationship between user trust and the use of online travel websites in the hospitality industry, [Agag and El-Masry \(2017\)](#) proposed assessments for the link between online application systems and the trust these systems generate in clients in relation to sustainability activities. Likewise, [Ladhari and Michaud \(2015\)](#) investigated the effect of reservations through Internet-connected systems in the hospitality sector on user trust. Based on this evidence, we propose the following hypothesis:

H3. PU of digital reservation systems would positively influence entrepreneur confidence in circular entrepreneurship.

Likewise, studying the factors that affect the adoption of sustainable applications, [Yoo et al. \(2017\)](#) considered the variables such as PU and user SA. Furthermore, [Park and Gretzel \(2007\)](#) studied the relationship between PU of mobile applications for control management, decision-making processes and knowledge development in the hospitality sector from a circular economy perspective. Taking these findings into account, we formulate the following hypothesis:

H4. PU of digital reservation systems would positively influence entrepreneurs' SA about circular economy.

Thus, [Herrero and San Martín \(2012\)](#) proposed a model to explain user adoption of websites in hospitality and investigated the relationships between the PEU and the PU of such applications when sustainability and services predictions are essential for circular economy. In addition, [Bader et al. \(2012\)](#) studied the use of technological applications in hospitality industry in a small company environment to explore how the use of these applications affects the user's environment. Taking into account the findings of these studies, we formulate the following hypothesis:

H5. Perceived ease of using digital reservation systems would positively influence PU of circular entrepreneurship.

Furthermore, [Lai et al. \(2013\)](#) investigated the effects that a website has on the trust of users who make purchases and reservations on the Internet. Specifically, the authors studied the relationship between the PEU of making reservations in web applications with the trust of users in these sustainable systems. Likewise, in a study on the use of map-based service applications for the hospitality sector, [Marzuki et al. \(2016\)](#) explored the relationship between the PEU of these types of applications and user confidence when using them in relation to green strategies. Based on the evidence argued above, the hypothesis six can be formulated:

H6. Perceived ease of using digital reservation systems would positively influence entrepreneurs' trust in circular entrepreneurship.

In addition, [Nunkoo and Ramkissoon \(2013\)](#) investigated the PU of digital technologies in the hospitality sector. Furthermore, [Lu et al. \(2005\)](#) explored the risks associated with the use of digital technologies connected to the Internet and studied the relationship between PU and ATU applications among users. Taking into account the findings of these studies, we formulate the following hypothesis:

H7. PU of digital reservation systems would positively influence ATU those systems in circular entrepreneurship.

Furthermore, based on the new digital technology of augmented reality (AR), [Chung et al. \(2015\)](#) investigated the relationship between the PEU of hotel applications and the ATU such

applications. Similarly, [Wöber and Gretzel \(2000\)](#) investigated the adoption of marketing decision support systems for managers in the tourism sector, how these influence their decisions, the creation of knowledge, and the extraction of insights that help to develop sustainable management strategies. Based on this evidence, the following hypothesis can be formulated:

H8. Perceived ease of using digital reservation systems would have a positive impact on ATU those systems in circular entrepreneurship.

[Lam and Hsu \(2006\)](#) demonstrated the link between the ATU user's applications and user behavior. Similarly, in a study on the relationships among perceived value, SA, and the ATU digital technologies for administrative management in the hospitality sector, [Jin et al. \(2015\)](#) found that these variables are related to the intention of using these applications. Considering these findings, in the present study, we will test the following hypothesis:

H9. ATU digital reservation systems would positively influence BIU such systems in circular entrepreneurship.

Finally, [Lee \(2018\)](#) investigated how customers use digital systems in the service industry. This study highlighted the importance of using management systems for organization and structuring of personnel and logistics, as well as its influence on the processes and management of major global projects. Likewise, [Sun et al. \(2020\)](#) explored the relationship between the BIU digital technologies and the hotel reservation payment system. In a similar study, [Morosan and DeFranco \(2014\)](#) investigated the relationship between management traditions in the hospitality sector and user intentions and behavior, and how the use of intelligent management systems can help decision-making to improve data sourcing as well as sustainable actions. Based on these investigations, the following hypothesis can be formulated:

H10. BIU digital reservation systems would positively influences ASU for business organization in in circular entrepreneurship.

4. Sample and data analysis

Data collection took place between September 10 and November 10, 2021. In the present study, we collected the online questionnaire responses from a total of 317 of 543 participants. The questionnaire responses were collected through a self-administered online questionnaire, with the dissemination of the questionnaire by email to a convenience sample. The questionnaire was sent to three confederations of hospitality business groups, including the members of the database of new hospitality businesses (entrepreneurs) in the Spanish provinces of Madrid, Albacete and Murcia. This ensured that the sample analyzed in this study provided an unbiased representation of the total population of Spain.

During the data collection, based on the exclusion criterion of ignorance about the concept of circular economy, 226 entrepreneurs were excluded from the final sample (41.6% of the total initial participants). The questionnaire was divided in two sections. The concept of circular economy was presented in the questionnaire, and entrepreneurs who were not familiar with the concept did not respond to the questionnaire. We introduced this filtering to ensure that entrepreneurs did not answer the second phase of the questionnaire expecting to obtain any kind of insight to improve their strategies if they supported the adoption of a digital reservation system. This additional filter ascertained the quality of the responses concerning the adoption of a digital reservation system to enable circular economy in the hospitality sector ([Murphy et al., 1996](#)). The first part contained the questions about demographic characteristics of the users and asked about the knowledge related to circular

economy. In section two, the individuals were asked to mark items on a 5-point Likert scale in which 1 was evaluated as strongly disagree and 5 as strongly agree in relation to the use of digital reservation systems to enable circular economy in entrepreneurship.

As shown in Table 1, the distribution of the sample in the present study was balanced (female respondents: 45%, male respondents: 55%). Most of the participants were aged between 31–45 years old (81%), followed by users aged 18–30 years old (11%), 46–55 years old (4%) and 56–65 years old (2%). Most of the participants (69%) were employed; 18% were self-employed, followed by 10% students and 8% unemployed. Regarding the level of education, over a half of the participants (63%) obtained a university degree, followed by 20% of the participants with bachelor's degree and an advanced diploma (15%). Most of the participants (76%) were entrepreneurs working in companies with less than 5 employees, followed by 23% of entrepreneurs working in companies with 6–10 employees.

4.1 Data analysis

For the development of the study and validation of the hypotheses, we developed the model of structural equations. This model has its origin in the variances (SEM). This type of research model enables a statistical investigation of predicted relationships by identifying dependent variables. This makes it possible to calculate and quantify direct and indirect indicators in the effects of the variables analyzed between them. This approach makes it possible to measure composed and factor models; accordingly, a model is proposed and the links between the proposed variables are studied.

In many previous studies, SEM was reported as one of the most used methods for the analysis of models where the relationships between variables are previously defined (e.g. Hair *et al.*, 2013). The analysis of these variables focuses on understanding the influence of each of

Classification variable	Variable	Frequency	Percentage
Gender	Female	142	45
	Male	175	55
Age	Don't know/no answer	0	0
	Below 18 years old	0	0
Employment	18–30	257	81
	31–45	35	11
	46–55	14	4
	56–65	7	2
	>65	4	2
	Don't know/no answer	0	0
Education	Student	32	10
	Housewife/husband	14	4
	Unemployed	27	8
	Employed	219	69
Company size	Self-employed	59	18
	No studies	6	1
	Advanced diploma	48	15
	Bachelor's degree/Professional qualification	64	20
	Graduate university	199	63
Company size	Don't know/no answer	2	1
	0–5 employees	242	76
	6–10 employees	74	23
	11–15 employees	1	0.3
	16–20 employees	0	0
	Over 20 employees	0	0

Table 1.
Participants
demographic
characteristics
(n = 317)

them and the options for their interpretation and significance; in addition, this technique also allows for a multi-group analysis (Faul *et al.*, 2007; Henseler *et al.*, 2014).

In addition, using the SEM technique has been argued to be relevant for an exploratory study of a novel topic. Therefore, using the SEM technique, different relationships can be identified, analyzed and proposed for future research. Likewise, this technique can be used to carry out exploratory studies when some of the analyzed variables are composed of dimensions or when the proposed model is complex. In the present study, the SmartPLS 3.0 software was used.

5. Analysis of results

The proposed model analyzes the utility of use and PEU and its direct and positive relationship on the SA and trust of the digital reservation systems used to enable circular entrepreneurship in hospitality. The proposed model has a multidimensional construct, which is trust.

5.1 Measurement model

The validation of the measurement scale unfolded in two steps. The first was the first order model, and the construct of trust was split into the following three dimensions: benevolence, honesty and competence (Levine and Schweitzer, 2014). This division was carried out because the dimensions must be measured separately. The three dimensions were grouped, forming the grouped variable of Trust (Wah Yap *et al.*, 2012). Once the variable was validated, the well-known second-order analysis started. Figure 1 shows the complete model with the trust variable in its three dimensions.

The first requirement that the model had to meet was that the loadings should have been greater than 0.7. In the proposed model, all loadings exceeded 0.7. In the second step, we verified that the Cronbach's alpha measures were above the threshold; to ensure this validity, the Dijkstra–Henseler's indicator (ρ_A) was used (Dijkstra and Henseler, 2015). The indicators were also above 0.7, so reliability of the model was ascertained.

Likewise, to ensure the convergent validity of the analysis, the average variance extracted (AVE) was evaluated using the criterion of Fornell and Larcker (1981). This criterion indicates that the minimum value of the constructs must be 0.5. In the present study, all items exceeded the said cut-off index (Farrell, 2010). Furthermore, as shown in Table 2, all constructs were reliable and explained more than 50% of the variance of their own items. All constructs exceeded the minim values of composite reliability and convergent validity.

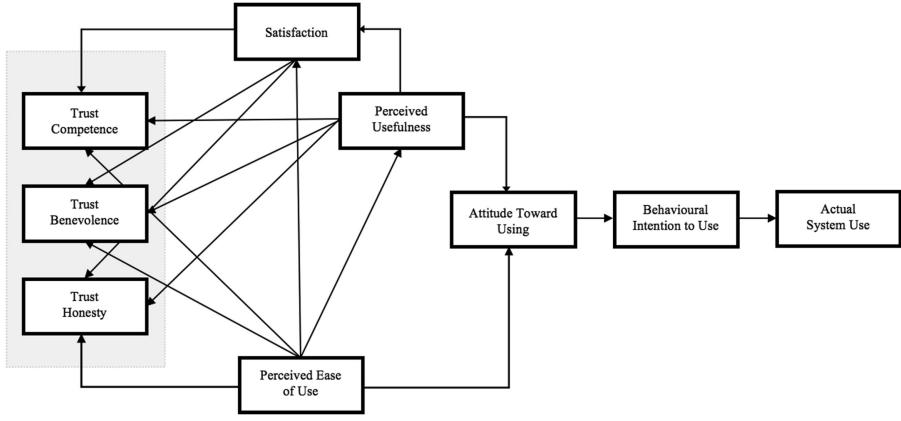


Figure 1.
Multidimensional
construct
validation (trust)

Items		Correlation loading	Cronbach's alpha	<i>rho_A</i>	Composite reliability	AVE
Actual System Use	(AS1) Using a *DRS is beneficial to my circular economy goals	0.779***	0.703	0.701	0.801	0.569
	(AS2) The use of a DRS is clear and understandable	0.824***				
	(AS3) I find that using a DRS in circular entrepreneurship projects in hospitality is easy	0.672***				
Attitude Toward Use	(AU1) Using a DRS is positive for my life	0.783***	0.844	0.840	0.889	0.676
	(AU2) Using a DRS increases my productivity at work	0.868***				
	(AU3) Using a DRS improves my effectiveness at work	0.861***				
	(AU4) Using a DRS would be good for my family	0.783***				
Behavioral Intention to Use	(IU1) I will recommend using a DRS to other entrepreneurs	0.847***	0.810	0.821	0.876	0.650
	(IU2) I hope to improve my quality of life by using a DRS	0.656***				
	(IU3) I intend to use a DRS as often as necessary to improve a circular economy	0.871***				
	(IU4) I hope to use a DRS in the coming months	0.842***				
Trust Benevolence	(TB1) A DRS developer companies are concerned with the interests and needs of their stakeholders (clients, entrepreneurs, future users, etc.)	0.916***	0.768	0.78	0.895	0.811
	(TB2) DRS developer companies take actions taking into account that they will impact their stakeholders (clients, entrepreneurs, future users, etc.)	0.884***				
Trust Competence	(TC1) A DRS show the necessary technological capacity to appropriately carry out its function	0.875***	0.72	0.722	0.877	0.781
	(TC2) A DRS fulfill its function expected of them	0.892***				
Trust Honesty	(TH1) A DRS are delivering on their promises regarding circular entrepreneurship	0.911***	0.705	0.731	0.862	0.758
	(TH2) A DRS when offering their features are transparent	0.828***				
Perceived Ease of Use	(PE1) Learning to use a DRS is easy for me	0.719***	0.818	0.842	0.873	0.583
	(PE2) Interaction with a DRS is clear and understandable	0.833***				
	(PE3) I find the a DRS flexible to interface with them	0.75***				
	(PE4) I find a DRS easy to use	0.84***				
	(PE5) Interacting with a DRS requires no mental effort	0.655***				
Perceived Usefulness	(PU1) Using a DRS improves my day-to-day performance	0.828***	0.844	0.852	0.889	0.616
	(PU2) Using a DRS allows me to better organize my day-to-day activities	0.805***				
	(PU3) Using a DRS would increase my productivity in my daily tasks toward circular economy	0.695***				
	(PU4) Using a DRS increases my work efficiency toward circular economy	0.735***				
Satisfaction	(PU5) I find it useful to use a DRS to complete sustainable actions	0.88***				
	(SAT1) The experience with a DRS meets my expectations	0.862***	0.845	0.848	0.907	0.764
	(SAT2) I am satisfied with the options provided by a DRS in relation to improving circular economy	0.868***				
	(SAT3) Overall, I am pleased to have used a DRS to improve circular economy	0.899***				

Note(s): * DRS: Digital Reservation System
 * p -value < 0.05, ** p -value < 0.01, *** p -value < 0.001

Table 2.
Measurement items first order

To complete the validation of the first order model, the Fornell and Lacker criterion was applied to measure the study of discriminant validity in order to accomplish the validation of the variables (Ciampi *et al.*, 2021). This analysis focused on measuring the amount of variance captured by indicators (AVE) of each construct and should have been greater than the variance that construct shared with other constructs of the model. Therefore, this analysis measured how different the constructs were from the others in the model. In this case, the square AVE roots of each construct had to be greater than its items than with the items of other model constructs (Afthanorhan, 2013). Table 3 shows the different correlations after the scale measures were established based on discriminant validity.

In recent years, the relevance of the use of Heterotrait-Monotrait (HTMT) analysis has frequently been highlighted (Henseler *et al.*, 2014). In the present study, we also used HTMT to vary the scale of measurements. This approach helps to confirm, in a more rigorous way, that all the constructs of the model achieve discriminant validity (Fornell and Larcker, 1981). Additionally, the variables did not obtain a value of 1 in any case, suggesting that the results of the variables were empirically different (see Table 4).

Once the first-order model was validated, the confidence items were grouped together. The proposed model is shown in Figure 2.

Likewise, the second-order analysis of the measurement scale was performed. In this way, the same analysis procedures of the first model were carried out, with the exception that, in the first model, all the items were categorized as reflective, while, in the final proposed model, the confidence variable had its items or dimensions grouped with a formative nature (Coltman *et al.*, 2008).

Therefore, to measure the validity of trust, a series of analyzes were executed to validate the scale of variables with reflective items. For the reflective variables, the loadings obtained in the analysis were the same. Regarding the individual validity and compound validity criteria, the results were also identical, so the results obtained for the final model were those already presented above for Alpha, r_ho and AVE (Afthanorhan, 2013).

	ASU	ATU	BIU	CB	CC	CH	PEU	PU	SA
Actual System Use (ASU)	0.761								
Attitude Toward Use (ATU)	0.489	0.825							
Behavioral Intention to Use (BIU)	0.552	0.648	0.809						
Trust Benevolence (TB)	0.445	0.354	0.364	0.9					
Trust Competence (TC)	0.523	0.332	0.41	0.641	0.884				
Trust Honesty (CH)	0.446	0.275	0.452	0.479	0.644	0.871			
Perceived Ease of Use (PEU)	0.584	0.297	0.363	0.385	0.513	0.408	0.763		
Perceived Usefulness (PU)	0.489	0.752	0.608	0.368	0.381	0.35	0.341	0.785	
Satisfaction (SA)	0.539	0.396	0.536	0.43	0.641	0.585	0.445	0.458	0.874

Table 3.
Discriminant Validity
(Fornell and Lacker,
1981) of the first-order
measurement model

	ASU	ATU	BIU	CB	CC	CH	PEU	PU	SA
Actual System Use (ASU)									
Attitude Toward Use (ATU)	0.617								
Behavioral Intention to Use (BIU)	0.733	0.784							
Trust Benevolence (TB)	0.641	0.43	0.454						
Trust Competence (TC)	0.79	0.422	0.528	0.862					
Trust Honesty (CH)	0.673	0.363	0.616	0.657	0.893				
Perceived Ease of Use (PEU)	0.838	0.337	0.425	0.47	0.651	0.507			
Perceived Usefulness (PU)	0.62	0.895	0.718	0.446	0.469	0.442	0.385		
Satisfaction (SA)	0.729	0.463	0.639	0.533	0.82	0.753	0.525	0.52	

Table 4.
Discriminant validity
heterotrait-monotrait
ratio (HTMT) of first-
order
measurement model

As indicated above, in order to complete the validation of the reflective variables, Fornell–Lacker and HTMT must be performed. Data obtained as a result of the analysis were not modified, and the results were similar to those that had been previously obtained. Once the reflective variables measurement scale was validated, the formative variable (trust) was analyzed (see Table 5). This was done by validating its weight and VIF (variance inflation factor), which is why the measurement scale was validated.

5.2 Structural model analysis

Once the measurement scales were satisfactorily validated, the results were analyzed to identify predictive capacities and the relationships obtained, as well as their meanings after establishing the research hypotheses. The methodological analysis was developed based on the measurement of: path coefficients (β), the R^2 values (variance explained), the effect size f^2 , and the test Q^2 (validated cross redundancy), in order to measure the predictive relevance of the model.

In order to measure the magnitudes and meanings, we had to rule out multicollinearity between the antecedents of the variables of each of the endogenous variables by means of VIF values of the model. Specifically, these values should have not exceeded 5. All VIF values of the proposed variable model were below 2,446, so it can be concluded that there was a low degree of multicollinearity. To measure the predictive power of the proposed model, which indicates the amount of variance of a variable explained by another predictive variable (known as determination coefficient R^2), the cut-off points for its analysis were 0.75 (relevant), 0.50 (moderate) and 0.25 (weak).

The results of R^2 indicated that the variables attitude toward using (0.568), trust (0.525), and BIU (0.42) obtained moderate results, while the remaining variables were SA = 0.304, ASU = 0.305, and PU = 0.115. While the value obtained for the variable BIU was within the cut-off weak points, it was very close to moderate and could be considered to have a moderate predictive character by explaining ($R^2 = 0.42$). As an additional analysis to R^2 , the effect size analysis of f^2 was examined. This analysis interprets the level of exogenous variable contributes toward explaining an endogenous variable. Table 6 shows that the relationships between (1) attitude toward using and, (2) PU and attitude toward using and (3) SA and trust

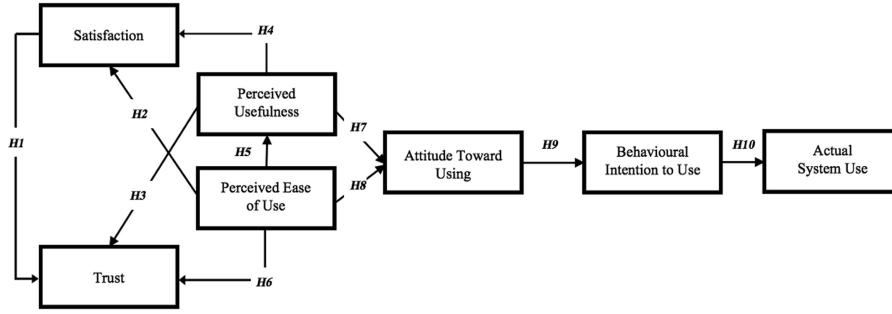


Figure 2.
The proposed model

Constructs	Dimensions	Correlation loading	Correlation (weights)	VIF
Trust	Honesty (HON) Benevolence (BEN) Competence (COM)	0.795 0.781 0.951	0.282** 0.259* 0.603***	1.732 1.720 2.266

Note(s): VIF—variance inflation factor

* p -value < 0.05, ** p -value < 0.01, *** p -value < 0.001

Table 5.
Second-order
measurement model
formative construct

were relevant, while that between BIU and ASU was moderate. The rest of the hypotheses had lacked effect.

Regarding redundancy indices with cross validation (Q2), also known as values that serve to examine the predictive relevance of the structural model in a theoretical way, it was observed that the results were higher than zero (Kubinyi, 1996). Therefore, we could conclude that the model had satisfactory predictive relevance.

Likewise, in the contrast analysis between the hypotheses, we observed that all the relationships were measured as significant. However, the relationship between PEU and attitude toward using, which did not reach the minimum value of $t = 1.645$; accordingly, the corresponding hypothesis had to be rejected. In addition, to have a greater reliability in the hypothesis test, the analysis of confidence intervals (non-parametric analysis) was performed. The results also indicated that the hypothesis 8 should be rejected. All other hypotheses were supported by the results of data analysis (see Figure 3).

	Path coeff (β)	Statistics t ($\beta/STDEV$)	f^2	Confidence Interval 5.0%	Confidence Interval 95.0%
H1. Satisfaction → Trust	0.525***	5.057	0.104	0.225	0.404
H2. Perceived Ease of Use → Satisfaction	0.328***	4.703	0.137	0.207	0.434
H3. Perceived Usefulness → Trust	0.276***	3.746	0.102	0.151	0.394
H4. Perceived Usefulness → Satisfaction	0.346***	4.954	0.152	0.225	0.456
H5. Perceived Ease of Use → Perceived Usefulness	0.339***	5.73	0.13	0.227	0.424
H6. Perceived Ease of Use → Trust	0.43***	6.296	0.249	0.309	0.531
H7. Perceived Usefulness → Attitude Toward Use	0.736***	20.11	1.11	0.667	0.789
H8. Perceived Ease of Use → Attitude Toward Use	0.048	0.86	0.005	-0.047	0.137
H9. Attitude Toward Using → Behavioral Intention to Use	0.648***	13.154	0.723	0.549	0.716
H10. Behavioral Intention to use → Actual System Use	0.552***	9.576	0.438	0.441	0.635

Note(s): R^2 : Actual System Use = 0.305; Attitude Toward Using: 0.568; Behavioral Intention to use = 0.42; Trust = 0.525; Perceived Usefulness = 0.115; Satisfaction = 0.304. Adjusted R^2 : Actual System Use = 0.301; Attitude Toward Using = 0.564; Behavioral Intention to use = 0.417; Trust = 0.519; Perceived Usefulness = 0.111; Satisfaction = 0.298. * p -value < 0.05, ** p -value < 0.01, *** p -value < 0.001; n/a—not applicable

Table 6.
Analysis of the proposed model hypotheses results

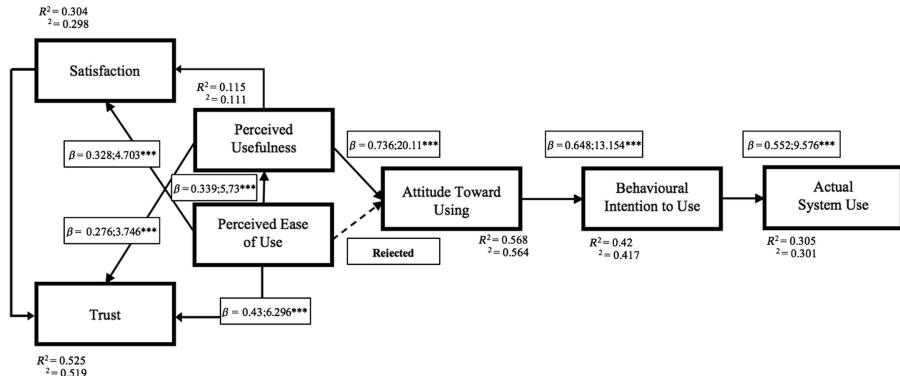


Figure 3.
Proposed research model results

6. Discussion

In the last decade, the hospitality industry has undergone many important changes. Consistently with the results reported by Okumus *et al.* (2018), our results confirmed that adopting new digital technologies for organization and management in the hospitality industry can increase the efficiency of organizations and resources, creation of knowledge, use of new sources of user information (Saura *et al.*, 2022b), prediction of services and demand and consequently, boost sustainability and circular entrepreneurship.

More specifically, in the present study, we found which variables positively affect entrepreneurs' trust and SA when using digital reservation systems to enable circular entrepreneurship. Specifically, we established that there is a strong positive relationship between attitude toward using a digital reservation system and such system when circular entrepreneurship is valued. Therefore, the attitude toward the use and adoption of new digital technologies that help entrepreneurs who attend hospitality businesses is positively linked to the actions and conscious thoughts of potential clients with respect to the sustainable actions developed by an entrepreneur project. Therefore, we agree with Khanpae *et al.* (2020) who argued that the use of this type of digital technologies improves customer intention to use of such applications and their experience while in the business' facilities due to the value perceived and linked to sustainability and circular entrepreneurship.

Similarly, several previous studies, such as Gallan *et al.* (2021), demonstrated that the changes in the hospitality industry related to the acquisition of new technological systems in an organization bring important benefits to the business in terms of its sustainability, profitability, organization, logistics and knowledge creation (Ribeiro-Navarrete *et al.*, 2021). In addition, we found a strong positive relationship between the perceived ease of using digital reservation systems and the attitude toward using such applications. Therefore, in the entrepreneurial hospitality sector, the ease of using reservation system provide added value to the business model proposed by each entrepreneur. These business models and organization systems must be easily perceived by entrepreneurs, so the attitude toward their use would be positive and entrepreneurs would be willing to use these services to guarantee their services (Dube *et al.*, 2020).

Our results also confirmed a link between perceived ease of using digital reservation systems and use, as we observed that the PU of this type of system increases entrepreneurs' confidence in using digital reservation systems in relation to circular economy. Furthermore, and in line with the results reported Carvajal-Trujillo *et al.* (2020), it can be concluded that the use of this type of new digital technologies increases entrepreneurs' trust in circular economy.

In the same way, regarding the hypothesized relationship between PEU and PU of these systems, our results confirmed that the perceived utility of use is strongly linked to the perceived utility that entrepreneurs see in this type of new technologies. As indicated by Do *et al.* (2020), the relationship between PEU and entrepreneurs' SA increases entrepreneurs' loyalty in circular entrepreneurship, such as hotels or restaurants. The same applies to the relationship between entrepreneurs' SA and entrepreneurs' trust, since SA with the use of the digital reservation systems positively influences entrepreneurs' trust in using of this type of application, (for similar conclusions, see Jin *et al.*, 2015; Alalwan, 2020).

Furthermore, our results showed a strong positive relationship between PU and attitude toward using an application, suggesting that PU of these types of systems improves entrepreneurs' attitude to circular economy and sustainability. This result is consistent with Vahdat *et al.*'s (2020) conclusion that digital management and organization systems can improve efficiency of the internal and external organization in this sector, thus enabling entrepreneurs to improve their experience of managing, collecting, and creating knowledge (Kusa *et al.*, 2021; Metallo *et al.*, 2021) and green resources. However, the hypothesis concerning the relationship between PEU and ATU had to be rejected, as no statistical significance was found to explain their relationship. This may be so because the PEU of these

management systems is not a key factor for the attitude toward their use, as the complexity of these systems makes it necessary for entrepreneurs to attend a training course to maximize the performance of the system and link its capacity to actions framed within the circular economy. This explains why the attitude toward use is determined by entrepreneurs' previous knowledge and their abilities to manage these systems, as it is important to highlight that the participants' answers to the questions related to this hypothesis were low.

Likewise, our prediction of a strong positive link between PU and entrepreneurs' trust was also supported by the results of data analysis. The finding that perceived utility increases entrepreneurs' trust in entrepreneurs when making using these technologies is also consistent with the results reported by [Bilgihan and Nejad \(2015\)](#). Finally, our results also confirmed the hypothesized link between the perceived utility of digital technologies and entrepreneurs' SA. Taken together, our results also highlight the relevance of analyzing the use of digital reservation systems in the hospitality sector to enable circular entrepreneurship.

7. Conclusions

In the present study, we investigated the effects of using digital reservation systems in the hospitality sector. Specifically, we proposed a model of how using these applications may affect entrepreneurs' trust and SA in circular entrepreneurship. Based on previous literature, we formulated and tested a total of 10 hypotheses, and all these hypotheses were supported by the results. In addition, we also found that, with the development of new technology-based systems, entrepreneurs in hospitality can develop strategies focused on knowledge creation, improvement of entrepreneurs' experience, development of new ways of accessing resources and processes, improve sustainability and logistics, as well as internal organization. These benefits cause companies to take better data-centric decision-making processes as a new source of project organization that boost circular entrepreneurship and sustainable actions. We also observed that the use of these systems is strongly linked to entrepreneurs' confidence; therefore, using digital reservation systems can serve as an effective way to increase clients' loyalty toward entrepreneur's projects in hospitality if clients are aware of the benefits of circular entrepreneurship.

7.1 Theoretical implications

Future research can use the results of the present study to investigate how digital technologies work and affect entrepreneurs' trust, SA and use of these digital systems in entrepreneurs' projects in hospitality. In addition, it would be interesting to explore how these factors influence hospitality in different business models that support circular economy in hospitality. To this end, researchers can use the variables used in the present study, along with other variables, to extend the proposed model and deepen our research. In summary, our study contributes to the literature on the use of digital reservation systems in hospitality sector and offer useful insight on how the adoption and use of new technologies can drive the management of knowledge and technology development, decision making, and acquisition of new data sources that improve the experience of both entrepreneurs and clients that interact with their services and that could enable circular entrepreneurship and to promote sustainability.

7.2 Practical implications

Hospitality companies can use the results of the present study to better understand the benefits of using digital reservation systems to improve sustainable actions linked to circular economy. In addition, hospitality companies can use the results to better evaluate how using these systems can affect the number of consumers, as well as to develop communication protocols with their employees and stakeholders. Furthermore, entrepreneurs operating in the hospitality sector can use our results to develop action plans focused on circular economy,

new knowledge creation, as well as development and adoption of new digital technologies that enable circular entrepreneurship. In this way, hospitality companies will be able to effectively combine both more traditional offline channels and new technologies, such as the combination of mobile applications, IoT, BD or the Internet.

7.3 Limitations and future lines of research

The limitations of this study are related to the size of the sample that was collected from a limited number of locations in the hospitality industry in Spain. Future research could be focus on comparing our results with other locations of the hospitality industry in Spain, the profile of the entrepreneurs who responded to the questionnaire and the analysis developed in SEM. Future research may also focus on the use of digital reservation systems in different hospitality businesses. In addition, this area of research can be extended to secondary sectors directly linked to hospitality and tourism, such as specialized businesses.

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