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Information technology capability and organisational agility: A study in the Canary Islands hotel industry

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ABSTRACT

Investments in information technology (IT) by the hotel sector are becoming increasingly important. However, it is necessary to analyse the extent to which IT contributes to hotels being 'agile' in responding to changes in the environment. The paper analyses the mediating and moderating role of IT capability in the relationship between IT uses and hotel agility. Results demonstrate the mediating role of IT capability, confirming IT uses affect organisational agility not only directly but also indirectly by improving the ability to manage technological resources. However, the role of IT capability as a moderator is not confirmed in this research. Such findings provide guidance to hotel managers to improve IT management and applications, suggesting future lines of research.

1. Introduction

The tourism industry, which covers a wide range of sectors and services, where the accommodation sector plays an important role, faces multiple uncertain and critical situations (Wang & Ritchie, 2012). In this regard, hotel management has to deal with numerous changes affecting the tourism industry, including environmental issues, economic crises, regulatory changes, and new customer demands (Faulker, 2001; Hall, 2010; Paraskevas & Altinay, 2013; Ritchie, 2004, 2009). This demands an orientation towards organisational agility as a management paradigm in changing environments (Sharifi & Zhang, 1999; Vázquez-Bustelo, Avella, & Fernández, 2007; Zhang & Sharifi, 2000). Thus, diverse studies focus on analysing organisational agility, its antecedents and consequences (Bottani, 2009; Cai, Richter, & McKenna, 2019; Chonko & Jones, 2005; Routroy, Potdar, & Shankar, 2015; Sharifi & Zhang, 1999).

One of the antecedents of organisational agility is IT (Tallon, Queiroz, Coltman, & Sharma, 2019), which stimulates strategic and operational management to face environmental changes (Aburub, 2015; Chen et al., 2014; Mandal, Korasiga, & Das, 2017). IT offers enormous possibilities for hotels to identify customer needs and preferences, and to anticipate and adapt their products and services. Furthermore, hotel managers can stimulate relationships with suppliers and strategic partners through their network connections and improve internal processes (e.g., Bilgihan, Okumus, Nusair, & Kwun, 2011; Buhalis & Main, 1998; Bulchand-Gidumal & Melián-González, 2011; Cai et al., 2019; Carroll & Siguaw, 2003; Chathoth, 2007; Piccoli, 2008). Also, considering the ongoing technological development, the ability to use IT is key for the tourism sector (Lin, 2016). However, there is not a typology of IT uses acknowledged in the literature. Moreover, based on Cai et al. (2019), there is no consensus on the concept of technology use. On the other hand, simply investing in IT is not enough to generate value in itself, but there must be efficient use and management of technological resources (Piccoli & Ives, 2005). As a result, the role of IT (IT uses and IT capability) in organisational agility should be addressed in the literature. However, Tallon et al. (2019), which review a broad number of studies on the influence of IT on organisational agility, identify multiple research approaches, making it difficult to draw conclusions and to advance in this field.

Based on the above, the study of IT as a factor that improves organisational agility is a relevant area of interest for the hotel sector, especially considering the large investments made in technological resources. In order to contribute to literature, this paper proposes a scale of IT uses in the hotel context. Moreover, this study analyses the extent to which IT uses contributes to hotel agility and examines the mediating and moderating role of IT capability in this relationship. The following section presents a review of the literature and the hypotheses of the study. Next, the methodology is described, explaining the context of the

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study and the measures used in the research. Finally, the main findings are discussed.

2. Conceptual framework

2.1. Vulnerability in the hotel sector and organisational agility

In the last decade, the tourism sector has faced significant challenges (technological innovation, economic crises, climate change, environmental disasters, etc.) (Seabra, Dolnicar, Abrantes, & Kastenholz, 2013; Wang & Ritchie, 2012). This has obviously affected hotels, where the complexity and dynamism of the tourism industry and the consequent vulnerability of hotels require management models that effectively address these challenges and changes (Faulker, 2001; Ritchie, Bentley, Koruth, & Wang, 2011). In this regard, in academic literature there is a growing interest in organisational agility to face uncertainty environments (Fahimi, Hesani, & Ahani, 2013; Sherehiy, Karwowski, & Layer, 2007; Tallon et al., 2019), which in turn has awakened academic interest in the hotel industry (e.g., Mandal et al., 2017). According to Bernardes and Hanna (2009), agility is more than flexibility and speed of action. It is the ability to adjust to changes in a timely manner. Sherehiy et al. (2007) state that agility implies adaptability and flexibility and represents the last stage of the development of this idea, which would include notions of flexible and adaptable organisation. In other terms, organisational agility is about the ability to detect and respond to threats and opportunities in the environment (e.g., Lowry & Wilson, 2016; Queiroz, Tallon, Sharma, & Coltman, 2018; Tallon et al., 2019). Moreover, organisational agility is considered a new management paradigm (Burgess, 1994; Fahimi et al., 2013; Zhang & Sharifi, 2000). In this regard, Sharifi and Zhang (1999, 2001) and Zhang and Sharifi (2000) analyse agility as a management model. From their holistic perspective, organisations face changes in the environment (agility drivers), such as changes in technology, customers, competitors, climate, etc. As a response, the organisation should develop a number of capabilities to be agile: respond proactively (responsiveness), process multiple products and services with the same resources (flexibility), perform tasks in the shortest possible time (speed), and possess "core competences" linked to successful organisations (strategic vision, quality management, organisational change, introduction of new products and services, etc.). Methods, practices, tools, IT, and human resources, among others, support these capabilities by acting as "agility providers".

2.2. IT uses and hotel agility

IT has become increasingly important in the tourism sector, due to the significant benefits it generates for all the agents involved, including hotels. In this regard, IT improve customer satisfaction, global market share, staff productivity and process standardization, and reduce operating costs (e.g., Buhalis & Main, 1998; Buhalis & O'Connor, 2005; Cai et al., 2019; Leung & Law, 2013; Lin, 2016; Ma, Buhalis, & Song, 2003). In recent years, there has been an important development of information technologies, which affect tourism management (e.g., Sigala, 2018; Xiang, 2019). Nowadays, there are a large number of IT resources that can significantly contribute to efficiency in both 'back office' and 'front office' hotel management, affecting various interest groups (clients, employees, suppliers, tour operators, etc.) (Bilgihan et al., 2011). Among the technological resources most widely used in the hotel sector are the following: ASP (Application Service Providers) (Paraskevas & Buhalis, 2002; Yao, Wohl, Watson, & Chen, 2003), ERP (Enterprise Resource Planning) (Buhalis & O'Connor, 2005; Leung & Law, 2013), and CRM (Customer Relationship Management), YMS (Yield Management System), and PMS (Property Management System) (Leung & Law, 2013). However, the optimal use of technological resources is more important than mere ownership or disposition. Thus, Law and Jogaratnam (2005, p. 177) observe that "computers tend to merely be used to duplicate the existing paper system. A computer can become part of the strategic planning process of a hospitality organization only when hotel managers make full use of it". Therefore, technology is no longer just a tool but a transformational driver of the industry structure (Sigala, 2018). In this regard, Tallon et al. (2019) state that the business strategy determines management decisions about the investment and uses of IT. In this decision-making process, management must take into account, on the one hand, how IT can influence areas and functions of the hotel and, on the other hand, that not all technologies are suitable for all types of hotels (Ruiz-Molina, Gil-Saura, & Šerić, 2013).

Regarding the role of IT in the 'agility' of hotels, Mandal et al. (2017) support the role of IT in organisational agility to cope with changes in the tourism sector. Moreover, studies focused on another sectors also indicate that IT positively enhances agility in uncertain contexts (e.g., Chen et al., 2014; Mavengere & Tikkamäki, 2013; Sharifi & Zhang, 1999; Tallon et al., 2019). Thus, Overby, Bharadwaj, and Sambamurthy (2006) assert that organisational agility should be measured as a function of sensing and responding capabilities, where IT would play an important, dynamic role. In addition, Tallon and Pinsonneault (2011) demonstrate empirically that the strategic alignment of IT contributes to organisational agility and, in turn, to performance. In this line, Aburub (2015) shows that ERP systems affect organisational agility in the banking sector. Similarly, Seethamraju and Sundar (2013) indicate that the proper use of ERP contributes to the agility of the processes involved. However, as noted in Tallon et al. (2019), there is a wide diversity of research perspectives on the role of IT in organisational agility. The present study follows an approach similar to that proposed by Cai et al. (2019), when referring to uses of technology, rather than resources or information system management. Based on the above, as hotels need to be agile in contexts of change (e.g., Mandal et al., 2017), and IT favours organisational agility (Sharifi & Zhang, 1999; Zhang & Sharifi, 2000), the first hypothesis of this research is established:

H1. *IT uses have a direct and positive influence on hotel agility.*

2.3. IT capability: mediating and moderating role in hotel agility

The success of IT implementation depends not only on technological resources and uses, but also on the adoption of a management approach. Thus, Mata, Fuerst, and Barney (1995) point out that the ability to organise and manage information technologies, and not just their ownership and expertise for use, generates sustainable competitive advantage. This perspective justifies that IT significantly improves business performance in terms of efficiency, coordination, innovation, alliance formation, etc. (Buhalis & O'Connor, 2005; Bulchand-Gidumal & Melián-González, 2011; Ma et al., 2003; O'Connor & Murphy, 2004). In this study, IT capability is conceptualised as the effective management of technology in the setting and achievement of organisational objectives, thus having an organisational role at the strategic and operational level. In this line, Lu and Ramamurthy (2011) state that IT capability enables firms to identify changes in the environment, control internal information, take quick and innovative decisions, promptly align internal processes, and, therefore, improve agility. Likewise, Li, Chen, and Huang (2006, p. 214) explain that IT capability refers to "the distinctive assets, competencies, knowledge, processes, and relationships that enable firms to effectively acquire, deploy, and manage IT products and services in shaping innovations and business strategies". Mao, Liu, and Zhang (2015) state that IT capability embraces both the quality of IT resources and the ability to manage them.

Regarding the impact of IT on the organisational system, IT influences the management of different organisational areas, such as procurement (Rodríguez-Escobar & González-Benito, 2015), human resources (Bondarouk, Parry, & Furtmueller, 2017), marketing (Karimi, Somers, & Gupta, 2001), and accounting (Ghasemi, Shafeiepour, Aslani,

& Barvayeh, 2011). Likewise, IT uses also affect the functions and staff of the information systems department, responsible for the development of technological capability. Therefore, IT uses contribute to IT capability in hotels. Thus, Real, Leal, and Roldán (2006) demonstrate that IT uses (e.g., to monitor competitors and partners, to collaborate with external agents) impacts on technological distinctive competences (e.g., capability to develop new products and processes, awareness of its innovation competencies). Furthermore, Gil-Padilla and Espino-Rodríguez (2008) highlight the relationship between the effective use of technological resources (e.g., reservations systems, tourism websites, or communication systems) and the capabilities linked to IT. In other words, technology at the service of technology. Therefore, the following hypothesis is proposed:

H2. *IT uses has a direct and positive influence on IT capability.*

In addition, there are numerous studies establishing a positive relationship between IT capability and organisational agility (Chen et al., 2014; Lu & Ramamurthy, 2011; Mao et al., 2015; Ravichandran, 2018). Following Mao et al. (2015), firms could improve organisational agility through knowledge capability and technology capability, with environmental uncertainty being a moderator variable. Panda and Rath (2016) highlight IT capability as an enabler of business processes and market-responsive organisational agility. However, if IT spending does not create superior capability, IT investments would not guarantee the overall organisational agility. Queiroz et al. (2018) confirm the influence of IT capability (in terms of renewing and adjusting technological resources to organisational needs) on organisational agility, mediated by the strategic orientation of the company. Likewise, Qosasi, Permana, Muftiadi, Purnomo, and Maulina (2019) empirically evidence that IT capability positively affects agility. On this basis, the following hypothesis is formulated:

H3. *IT capability has a positive influence on hotel agility.*

This research also analyses if the technological capability mediates the relation between IT uses and organisational agility. In other words, IT uses contribute to the development of IT capability and, thus, to organisational agility. Sharifi and Zhang (1999) and Zhang and Sharifi (2000) recognize that IT is an "agility provider" that influences the organisational capabilities linked to agility, among them, appropriate technology and sufficient technological ability. In this line, Gil-Padilla and Espino-Rodríguez (2008) explain that the information systems department uses certain technological applications or resources (e.g., applications to support decision making, connection to tourism websites), as key assets for capabilities development, which impacts on organisational performance. These authors recognize customer satisfaction as an indicator of organisational performance, which is a relevant stakeholder in organisational agility, as Sambamurthy, Bharadwaj, and Grover (2003) point out. Likewise, they find significant correlations between certain technological resources and capabilities linked to the information systems area. Therefore, the following hypothesis is established:

H4. *IT capability mediates the relationship between IT uses and hotel agility.*

Furthermore, the moderating role of IT capability in the relationship between IT and organisational agility is analyzed. Thus, Queiroz et al. (2018) indicate that, although the literature has paid more attention to the impact of IT infrastructure on organisational agility, the capability to develop, acquire or cease IT applications is more important. On this basis, a company that allocates the same budget to investment in technology may be less agile depending on how technological resources acquired are managed. In this line, as stated in Felipe, Roldán, and Leal-Rodríguez (2016), information systems capabilities contribute to the successful use of technological assets. In other words, the optimal use of technological resources that maximise organisational agility depends on the technological capability that determines the most convenient use of available technological assets. Based on the above, the following hypothesis is established:

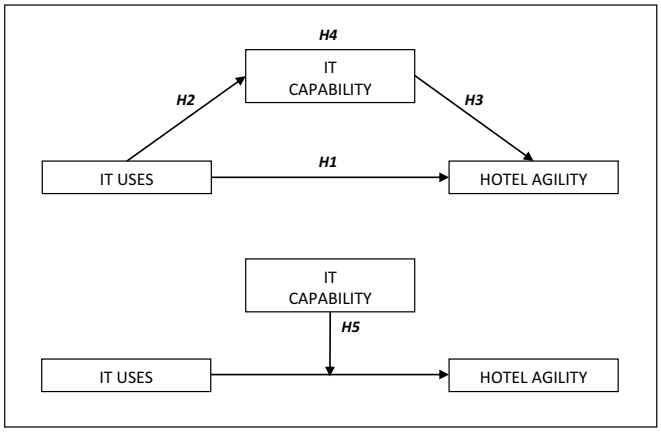

Fig. 1. Proposed model.

H5. *IT capability moderates the relationship between IT uses and hotel agility.*

The hypothesised relationships are displayed in the conceptual model shown in Fig. 1.

3. Methodology

3.1. Data collection

In order to test the model, the study used the key informant method to collect survey data from the hotel industry in Spain. The empirical study involved three phases. Firstly, based on an in-depth literature review, we designed a structured questionnaire, which was also revised by tourism experts and hotel managers. Secondly, an online survey was prepared, which included choosing the most suitable tool, creating the survey design and testing the online questionnaire. Thirdly, the online survey was conducted among the general managers of four-star, five-star, and Great Luxury (GL) hotels in the Canary Islands. The choice of the hotel director as the key informant is mainly due to the fact that he or she has a global view of hotel functioning. In addition, IT is a key strategic tool to support top management in decision making, which enhances competitiveness of tourism organisations (Cai et al., 2019). In this sense, the strategic role of IT makes top management aware of the effect of IT on organisational success and, even more so, because they are active users of technologies on a daily basis (Gonzalez, Gasco, & Llopis, 2015). All this qualifies the general manager of the hotel as the key informant for the research objectives.

A total of 268 hotels constituted the target population of the study. The survey was conducted between November 2016 and May 2017, and 72 completed questionnaires were received, resulting a response rate of 26.87% and with a sample error of 9.9%, which is not unusual for research in this field (Thomas & Wood, 2014). The questionnaire can be retrieved from the Appendix section.

3.2. Measures

The measurement scales were developed after literature review. All items of the constructs were measured on a Likert scale ranging from 1 to 7. Based on research contributions (e.g., Blome, Schoenherr, & Rexhausen, 2013; Buhalis & O'Connor, 2005; Lu & Ramamurthy, 2011; Pavlou & El Sawy, 2010; Vinodh, Aravindraj, Pushkar, & Kishore, 2012), IT capability of the hotel was measured with five items, concerning the operational and strategic use of technological resources, the acquisition of relevant technological resources in hotel management, and the importance of using technology resources for success.

The scale of IT uses was built with 23 items, distributed into four dimensions: external agents, human resources, products and services, and processes. The first dimension refers to access to relevant information on the general environment and external stakeholders, rapid communication with agents, and alternative communication channels (Buhalis & O'Connor, 2005; Carroll & Siguaw, 2003; Law, Leung, & Chan, 2019; Melián-González & Bulchand-Gidumal, 2016; Novelli, Schmitz, & Spencer, 2006; O'Connor & Murphy, 2004; Piccoli, 2008; Vinodh et al., 2012). The "human resources" dimension relates to the exchange of job information, and the discussion and sharing of ideas among workers (Blome et al., 2013; Bulchand-Gidumal & Melián-González, 2011; Law et al., 2019; Leung & Law, 2013; Mamoudou & Joshi, 2014; Mathai & Arumugam, 2016; Overby et al., 2006). The "products and services" dimension includes items related to expanding the product and service portfolio, market monitoring, and online management of tourist services (Bilgihan & Wang, 2016; Carroll & Siguaw, 2003; Ivanović, Perman, & Grlj, 2015; Law et al., 2019; Law, Leung, & Buhalis, 2009; Leung, Bai, & Erdem, 2017; Leung & Law, 2013; Majra, Saxena, Jha, & Jagannathan, 2016; Rahimi, 2017). Finally, the "processes" dimension focuses on the systematization of front and back office management processes (Buhalis & Law, 2008; Buhalis & O'Connor, 2005; Bulchand-Gidumal & Melián-González, 2011; Lu & Ramamurthy, 2011; Mihalic & Buhalis, 2013).

Hotel agility was assessed with three items related to the company's ability to be agile and adapt to the environment. This measure was developed based on the essence of the concept of agility, which refers to the ability to be flexible and respond to the environment quickly and proactively (Blome et al., 2013; Sharifi & Zhang, 1999; Sherehiy et al., 2007; Zhang & Sharifi, 2000).

Control variables were also used, such as star rating, size, and age of hotels. As many studies show, all these variables are relevant attributes for studying IT in the hotel sector (Namasivayam, Enz, & Siguaw, 2000; Sahadev & Islam, 2005).

4. Results

4.1. Sample profile

The sample mainly consists of four-star hotels (80.56%), while only 19.44% are five-star and GL hotels. Respondents were the general managers of hotels in the following proportions: 19.05% of participants from hotels with 50–100 employees, 19.05% from hotels with 101–150 employees, 28.57% from hotels with 151–200 employees, 22.22% from hotels with 201–250 employees, and 11.11% from hotels with > 251 employees. In terms of age, nearly 27% of hotels are under 10 years old; 31.75% are between 11 and 20 years old; 17.46% are between 21 and 30 years old, and 23.81% are over 30 years old.

4.2. Reliability and validity assessments

Regarding the design of the scales, their content validity is based on the rigorous procedure followed: the review of the literature and the recommendations of academics and professionals from the tourism industry. To examine the dimensionality of the constructs proposed in the model, the statistical tool used is principal component analysis with *varimax* rotation. The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity are performed to determine the suitability of the data for factor analysis. Values above 0.5 are recommended as an acceptable limit for the KMO index, and the Bartlett's test must be significant at $\alpha < 0.05$ (Hair, Black, Babin, & Anderson, 2014). Then, the sampling was adequate to proceed with factor analysis. The dimensionality of the constructs in the present study is evaluated: IT uses, hotel agility, and technological capability. Table 1 shows the results of the factor analysis. In all cases, the KMO index and Bartlett's test are acceptable.

IT uses. Results evidenced the four differentiated factors suggested by the theoretical approaches. However, some of the theoretically proposed items were removed considering their low factor loadings. The four dimensions were the following: "external agents" (6 items), "human resources" (4 items), "product/service" (4 items), and "processes" (3 items). Results of the factor analysis were satisfactory as they explain 77.48% of the total variance. Also, the explained variance of each item, expressed through communalities, was high, reaching values above 0.6. Likewise, correlations between the factors and the different items, expressed through the factor loadings, are significant, with levels above 0.5 (Hair et al., 2014).

Hotel agility. The test reveals that this construct is one-dimensional. Results of the factor analysis are satisfactory as they explain 83.89% of the total variance, and communalities are > 0.8. Also, factor loadings are highly relevant as they all indicate levels above 0.89.

IT capability. The analysis evidences that IT capability is a one-dimension construct. The scale explains 66.65% of the total variance, factor loadings are above 0.75, and communalities are > 0.55.

In addition, discriminant validity was evaluated, confirming that correlations between each pair of variables do not contain the value 1, at a confidence interval of 95%. Since the constructs do not correlate perfectly, each of them represents a different concept. Furthermore, Cronbach's alpha was used to evaluate the measures' reliability. Table 1 shows the reliability levels obtained for the scales of IT uses, hotel agility, and IT capability. All the analyzed constructs and dimensions can be classified as good because they have values between 0.8 and 0.9 (George & Mallery, 1995). These results confirm that constructs and dimensions of the conceptual proposed model are highly reliable.

4.3. Testing direct and indirect effects

Multiple regression analysis was used to assess the positive influence of the independent variables on hotel agility. Control variables were transformed into dummy variables in order to be included in the regression analysis. The results of this analysis are shown in Table 2. All the variance inflation factors (VIFs) and the condition number were below the threshold values (Hair et al., 2014), suggesting the absence of multicollinearity in the data. The results of the regression analysis in Model 1 evidence an association between IT uses and hotel agility. The *F*-statistic for the model is statistically significant ($F = 16.736$, $p < .001$). The adjusted R^2 shows that control and independent variables explain 60.8% of the variance in organisational agility. Results suggest a positive and statistically significant effect of "external agents" ($\beta = 0.753$, $p < .001$), "human resources" ($\beta = 0.355$, $p < .001$), and "product/service" ($\beta = 0.189$, $p < .05$) on hotel agility. In general, this fact evidences the positive influence of IT uses on organisational agility. These results provide support for hypothesis H1.

Model 2 presents the significant effect of IT uses on IT capability. The *F*-statistic for the model is statistically significant ($F = 12.271$, $p < .001$). Results show a statistically significant influence of "external agents" ($\beta = 0.257$, $p < .01$), "human resources" ($\beta = 0.462$, $p < .001$), and "product/service" ($\beta = 0.428$, $p < .001$) on technological capability. This suggests that IT uses, in general terms, are a significant predictor of the latter. These results provide support for hypothesis H2.

Model 3 displays the association between IT capability and hotel agility. The *F*-statistic for the model is statistically significant ($F = 7.907$, $p < .001$). The results of the regression analysis show a significant effect of IT capability on hotel agility ($\beta = 0.577$, $p < .001$), supporting hypothesis H3.

To test the mediating effect of IT capability on the relationship between IT uses and hotel agility, we followed the method suggested by Baron and Kenny (1986) and Frazier, Tix, and Barron (2004). This means testing for (1) the effect of the independent variable on the dependent variable, (2) the effect of the independent variable on the mediator variable, and (3) the effect of the independent and mediator variables on the dependent variable. The mediator effect exists when

Table 1
Factor analysis.

Constructs	Communalities	Factor loadings
IT uses		
Related to external stakeholders (α = 0.919; variance explained = 25.987%)		
Access to relevant information on the general environment, such as macroeconomic, legal, financial, social and political data (online access to newspapers, publications and reports from public institutions…)	0.878	0.901
Access to relevant information from important external partners and/or agents such as competitors, suppliers, tour operators, transport companies (online access to sector magazines, corporate websites…)	0.680	0.585
Rapid updating of information for external stakeholders (customers, suppliers, tour operators …), communicated via the hotel's website, tourist apps, social networks, email	0.828	0.723
Rapid communication with external stakeholders, such as customers, suppliers, intermediaries, banks, public administrations (solving a last-minute problem with the reservations of a tour operator, with the order delivery from the supplier…)	0.871	0.912
Development of alternative communication channels with external stakeholders, such as customers, suppliers, banks, public administrations (hotel website, social networks, email…)	0.712	0.670
Corporate presence in the market (transmitting the company image, communicating the mission and vision of the company, publishing corporate social responsibility…)	0.795	0.682
Related to human resources (α = 0.810; variance explained = 21.205%)		
Updating of employees' skills and abilities (online training, video tutorials, etc.)	0.801	0.784
Employees' access to relevant information about the content of their job (access to quality standards, procedures manual on the corporate intranet...)	0.840	0.706
Transmission of suggestions and complaints by employees (online suggestion box, chats...)	0.779	0.827
Discussion of ideas and information within the hotel (for example, discussion forums for employees on the hotel intranet or social networks)	0.653	0.711
Related to product/service (α = 0.785; variance explained = 15.641%)		
Access to relevant information on new trends and preferences of tourists (tracking customer opinions on TripAdvisor or Booking…)	0.651	0.795
Extension of the hotel's products and services (Wi-Fi, technological equipment in meeting and conference rooms, video game consoles and/or electronic books in the rooms…)	0.700	0.797
Online management of customer relationship and loyalty (social networks, web, apps, blogs…)	0.813	0.599
Online management of advertising and selling hotel products and services (social networks, web, apps, blogs…)	0.662	0.702
Related to processes (α = 0.795; variance explained = 14.647%)		
Systematization of front office management (check-in and check-out software…)	0.878	0.821
Systematization of back office management (software for food and beverage inventory management...)	0.806	0.879
Systematization of management with external partners and/or agents such as suppliers, tour operators, travel agencies, public administrations, professional associations (online purchase of supplies, online booking management with tour operators or travel agencies…)	0.827	0.667
Cronbach's alpha	0.903	
Variance explained	77.480	
KMO index	0.777	
Bartlett's test	985.570***	
Hotel agility		
Organisational agility	0.886	0.942
Adaptation of the hotel to the environment	0.834	0.913
Adjustment of the hotel to the environment	0.796	0.892
Cronbach's alpha	0.896	
Variance explained	83.886	
KMO index	0.729	
Bartlett's test	138.966***	
IT capability		
Maximizing the strategic and operational use of technological resources	0.714	0.845
Incorporating and updating the relevant technological resources for hotel management (CRM, PMS, ERP…)	0.557	0.746
Integrating technological resources in the hotel activity in a logical way (by adjusting to the work procedures, to the level of training of employees...)	0.751	0.866
Maximizing the usefulness of technological resources for hotel management	0.634	0.796
Transmitting to employees the importance of the strategic and operational use of technological resources for hotel success	0.677	0.823
Cronbach's alpha	0.867	
Variance explained	66.653	
KMO index	0.781	
Bartlett's test	195.059***	

Level of significance: ***p < .001.

the effect of the independent variable on the dependent variable in (3) is less than in (1), showing partial mediation. If the independent variable has no longer influence on the dependent variable, full mediation is noted.

The first two conditions are satisfied, as shown in Models 1 and 2. The results related to the third condition are displayed in Model 4. The *F*-statistic for this model is statistically significant ($F = 16.011$, $p < .001$). VIFs and the condition number suggest the absence of multicollinearity in the data. The adjusted R^2 indicates that the predictors explain 62.8% of the variance in hotel agility. As shown, the effects of "external agents" ($\beta = 0.692$, $p < .001$) and "human resources" ($\beta = 0.246$, $p < .01$) on agility have decreased, but remain statistically significant, suggesting partial mediation of IT capability. However, the influence of "product/service" on agility is no longer significant ($\beta = 0.089$, $p > .05$), indicating full mediation of IT capability in this relationship. Therefore, hypothesis H4 is supported; IT capability generally mediates the relationship between IT uses and hotel agility.

Finally, hypothesis H5 stated the moderating role of IT capability in the relationship between IT uses and hotel agility. As shown in Table 2, four interaction terms were formulated to test the moderating effect of technological capability. An interaction effect exists if the interaction term makes a significant contribution beyond the main effects model (Cohen & Cohen, 1983). Model 5 comprises the results of the regression analysis, evidencing that the relationship between each interaction term and hotel agility is not statistically significant. Consequently, from this research, IT capability does not moderate the relationship between IT uses and organisational agility. Therefore, hypothesis H5 is not

Table 2
Tests for mediating and moderating effects.

	Hotel agility	IT capability (ITC)	Hotel agility	Hotel agility	Hotel agility
	Model 1	*Model 2*	*Model 3*	*Model 4*	*Model 5*
	Standardized coefficients	Standardized coefficients	Standardized coefficients	Standardized coefficients	Standardized coefficients
Direct effects					
Star rating	0.086	0.038	0.090	0.077	0.086
Size	0.222*	0.205*	−0.139	0.174	0.160
Age	−0.072	−0.142	0.148	−0.038	−0.070
External agents	0.753***	0.257**		0.692***	0.703***
Human resources	0.355***	0.462***		0.246**	0.303**
Product/service	0.189*	0.428***		0.089	−0.001
Processes	−0.042	0.156		−0.078	−0.017
ITC			0.577***	0.235*	0.113
Interaction effect					
External agents X ITC					−0.007
Human resources X ITC					0.033
Product/service X ITC					−0.232
Processes X ITC					−0.001
Adjusted R^2	0.608	0.526	0.280	0.628	0.627
F	16.736***	12.271***	7.907***	16.011***	10.962***
Durbin-Watson	1.877	2.428	1.661	1.751	1.622
Multicollinearity:					
VIF (min./max.)	1.019/1.443	1.019/1.443	1.099/1.213	1.076/2.342	1.241/3.533
Condition number	3.544	3.544	3.491	3.563	4.867

Levels of significance: *p < .05, **p < .01, ***p < .001.

supported.

5. Discussion and conclusions

IT is an increasingly important organisational resource in hotel management due to its operational and strategic advantages, affecting various interest groups (Buhalis & O'Connor, 2005; Bulchand-Gidumal & Melián-González, 2011; Leung & Law, 2013). Examples of this include free software packages such as Odoo for hotel management (available to be adapted to work areas according to organisational needs) and other software that facilitates the internal and external hotel management, such as CRM, PMS, or ERP, improving relationships with stakeholders (Buhalis & O'Connor, 2005; Leung & Law, 2013; Paraskevas & Buhalis, 2002), among others. In addition, new technologies empower tourists to manage their trips, for example using their own mobile devices (mobile phone, tablet or laptop). This behaviour encourages hotels to use technological tools to foster customer relationship, such as CRM (Mohammad, Rashid, & Tahir, 2013; Rahimi, Köseoglu, Ersoy, & Okumus, 2017), improving hotel management through their integration with PMS software. In this way, IT enables the identification of market opportunities and the optimal exploitation of organisational resources (Rialti, Marzi, Silic, & Ciappei, 2018).

Nevertheless, not all investments in technology are profitable, especially when they do not meet organisational needs (e.g., Ruiz-Molina et al., 2013; Tallon et al., 2019). Acknowledging that IT can enable organisations to cope with changing contexts (Chen et al., 2014; Overby et al., 2006; Tallon & Pinsonneault, 2011), this research examines how IT contributes to organisational agility. In this regard, the literature reveals a great diversity of approaches for studying the role of IT in organisational agility (e.g., Tallon et al., 2019; Tallon & Pinsonneault, 2011), which makes it difficult to draw comparable conclusions. In addition, technological innovation is continuously advancing (Lin, 2016); therefore, hotels need to choose the technology appropriate to their organisational strategy and operations (Ruiz-Molina et al., 2013). In this setting, hotels should analyse the types of IT uses, which requires identifying what IT is needed for, what it facilitates, and what it contributes to. In addition, the optimal use of technological resources is not a function of the investment undertaken by the organisation, but of technological capability (Aduloju, 2014; Piccoli & Ives, 2005; Queiroz et al., 2018). Indeed, technological capability incorporates, among other issues, both selecting technology assets and integrating business strategy with current technology potential. This capability encourages the strategic use of technological resources for the daily organisation management. Likewise, adding new technological resources for this management facilitates the strategic and operative optimization of these resources (Bustinza, Vendrell-Herrero, Perez-Arostegui, & Parry, 2019; De Mori, Batalha, & Alfranca, 2016). Therefore, IT capability is a differential strategic factor of hotels in a global and multidisciplinary market in continuous development. On this basis, the analysis of the role of technological capability in the effect of IT on hotel agility becomes a topic of interest, given the significant budget for technology investments. The proposed research model studies the mediating and moderating role of technological capability in the relationship between IT uses and hotel agility.

The importance of studying IT uses in the tourism industry has recently been analyzed by Cai et al. (2019). In this sense, an important theoretical contribution of this paper is the empirical validation of a scale of IT uses in the hotel context, which identifies four types of uses (external stakeholders, human resources, product/service, and processes). This typology covers both back office and front office functions, as well as relationships with different stakeholders in the sector. In addition, IT uses find content validity from other authors (e.g., Law et al., 2019; Ruiz-Molina et al., 2013). Moreover, the empirical data from the study reveal the positive influence of "external agents", "human resources" and "product/service" on hotel agility. Therefore, hotel managers should select those technological resources that promote such types of IT uses. Thus, the same technological resource, such as mobile technology, would bring both advantages to guests and to hotel management itself (e.g., Law, Chan, & Wang, 2018; Lei, Wang, & Law, 2019). Moreover, this provides a criterion for a successful technology investment, as suggested by several studies (e.g., Piccoli & Ives, 2005; Ruiz-Molina et al., 2013). However, although the use of IT for the process systematization is recognized in the literature (e.g., Bulchand-Gidumal & Melián-González, 2011; Mihalic & Buhalis, 2013), it could be a barrier to flexibility when facing changes, as stated by Overby et al. (2006).

A second theoretical contribution of this work is the analysis of the relationship between IT uses and IT capability, and the influence on

hotel agility. The empirical data reveals that technological capability plays a mediating role in the relationship between IT uses and hotel agility. In other words, IT represents a key tool for the development of technological capability that, in turn, improves the hotel's capability to respond to changing environment. Therefore, hotel managers should enhance the effective management of technological assets and should give IT a more active role in the design of business strategies, as new technologies create new competitive scenarios. To this end, it is recommended to improve the training of IT staff at strategic and operational levels. Furthermore, hotel managers should outsource IT-related functions that do not generate added value, and develop internally the activities that are sources of competitive advantage. Furthermore, Espino-Rodríguez and Ramírez-Fierro (2017) propose to strengthen the relationship between the hotel and the technology service provider to improve organisational performance. This strategic management approach enables hotel managers to have a holistic view of the contribution of technological resources to the overall strategy. Therefore, IT uses necessary for hotel strategy foster the success of information systems management. Based on IT uses proposed in this paper, hotel management should collaborate internally and externally with all stakeholders to identify their technology needs. On the other hand, findings also reveal that, from the perspective of hotel managers, IT capability does not moderate the influence of IT uses on organisational agility. Hotel managers may consider that other organisational capabilities (human resource management, knowledge management, etc.) have more influence on that relationship. Thus, high-performance human resource practices (e.g. continuous training in IT, incentive schemes) could contribute to the optimal use of IT and thus to organisational agility. In this regard, the literature on IT has shown the positive influence of staff training and participation in information systems design to improve organisational performance (e.g., Khalifa & Alswailem, 2015; Namakula & Kituyi, 2014; Silow-Carroll, Edwards, & Rodin, 2012).

Finally, the study was conducted in hotels located in the Canary Islands (Spain). It would be advisable to carry out the research in other destinations and for other types of hotels in order to make comparisons and improve the proposed scales and recommendations. On the other hand, the hotel management perspective has been used, and it would be worth replicating this study by considering hotel employees (managers and non-managers) as key informants. In addition, it would be important to analyse IT uses in different hotel departments and its impact on organisational agility. It is of great interest to continue deepening this line of study, especially when the continuous technological development offers new possibilities to hotel management and, with it, to organisational agility. Thus, in the IT literature, a more sophisticated terminology is introduced, and Buhalis and Leung (2018) propose new issues such as “hospitality ecosystem”, “smart hospitality”, and “data flow in smart hospitality network”. Also, as Tallon et al. (2019) observe, it would be interesting to study the autonomy of business units versus technological centralization. This line of research would contribute to the understanding and deepening of the moderating role of IT capability. Another line of future research could be to evaluate the flexibility of the process systematization according to hotel requirements.

Author's contributions

Lucía Melián-Alzola contributed to the literature review and conceptual model proposal, collected and analyzed data, and wrote the manuscript.

Margarita Fernández-Monroy contributed to the literature review and conceptual model proposal, collected and analyzed data, and wrote the manuscript.

Marisa Hidalgo-Peñate contributed to the literature review and conceptual model proposal, collected and analyzed data, and wrote the manuscript.

Declaration of Competing Interest

None.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.tmp.2019.100606.

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