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DIGITAL-BASED CRITICAL SUCCESS FACTORS IN THE ITALIAN HOSPITALITY BUSINESS

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Abstract

Purpose: *Small and medium enterprises (SMEs) are the backbone of the economies of many countries around the world. In recent years, the debate around the digital transformation of the European tourism industry has gained huge attention from both academia and industry.*

Approach: *Despite their importance, there is still a dearth of research devoted to analysing the digital-based critical success factors (DCSFs) for the successful operation of small-scale hotel businesses and comparing them with those of larger hotels. This study aims to deepen the scientific debate around this somewhat overlooked research area by presenting and discussing the results of an empirical study conducted on a sample of 367 Italian hotel businesses.*

Finding: *Results of exploratory factor analysis indicate that the main DCSFs are "internet and social media", "virtual reality", "robots,", and "artificial intelligence in data analytics". Moreover, a series of ANOVA independent t-tests reveals that significant differences exist in the hotel managers' and owners' views about DCSFs based on the hotel size (SMEs versus large hotels) and their level of education and work experience.*

Implications: *Contributions to the current body of knowledge and managerial implications are discussed, and suggestions for further research are derived.*

1. Introduction

The tourism industry is highly fragmented, being characterised by many SMEs (Dredge, 2006). Italy is unquestionably one of the many nations in the world where small tourism operators constitute the foundation of the economy (Avcikurt, Altay & Oguzhan Ilban, 2011; Coles, Warren, Borden & Dinan, 2017). According to Morrison, Carlsen, and Weber (2010), SMEs are particularly important for the tourism industry in developing nations, rural areas, and underdeveloped areas (Yeh & Fotiadis, 2014). The engagement of academics in research connected to SMEs in tourism can still be deemed limited, even though the literature on SMEs has greatly evolved over the past few decades (Halla, Assaker & O'Connor, 2013). Particularly, both academia and industry have devoted a lot of attention to the adoption of new technologies (El-Gohary, 2012) and have widely concurred that digital technologies are a key to success in the tourism and hospitality industries (Teodoro, Dinis, Simões & Gomes, 2017; Vladimirov, 2015). The tourism industry in Italy is experiencing an impressive post-pandemic recovery (WTTC, 2023). According to ISTAT, the Italian National Statistics Office, Italy registered 63,427,781 arrivals in 2022, with the tourism sector expected to contribute 195BN euros to the Italian economy in 2023 (WTTC, 2023).

In this scenario, given the crucial role of hotels within the ecosystem of tourism destinations (Inversini, Saul, Balet & Schegg, 2023), deepening our understanding of the critical success factors (CSFs) in the hospitality business is pivotal. CSFs are defined as "the small number of areas in which good results would ensure successful competitive performance for individuals, departments, or organizations" (Bullen & Rockart 1986, p. 385). According to Leidecker and Bruno (1987), CSFs are "those features, conditions, or variables that, when correctly sustained, maintained, or managed, can have a significant impact on the success of a firm competing in a given industry" (p. 333). Critical success factors may be internal or external and may have a positive or negative impact on a business success (Brotherton, 2004; Beaver, 2002). They are based on perceptions and differ from person to person (Lumpkin & Ireland, 1988). Despite the fact that CSFs have been widely analysed in the area of SMEs in several sectors (Haktanir & Harris, 2005), the majority of studies have only been conducted in the United States (Geller, 1985), the United Kingdom (Brotherton & Shaw, 1996), the Netherlands (Bortherton, Heinhuis, Miller & Medema, 2003), Turkey (Avcikurt et al. 2011), and the United Arab Emirates (Ahmad, 2014), with few studies devoted to the hotel sector and no attention given to the Italian hotel context. Even fewer studies have focused on digital-based success factors, which is surprising, given the remarkable growth of technologies 4.0 in recent years (artificial intelligence, robotic, virtual reality, etc.). Numerous studies call the attention of researchers to deeply investigate factors such as

the lack of information and communication technologies (ICTs) adoption, poor use of the internet, and social media marketing, in analysing SME failure (El-Gohary, 2012; Karanasios & Burgess, 2008; Lawason, Alcock, Cooper & Burgess, 2003).

While existing literature tends to widely concur that SMEs and big hotels differ in terms of their marketing and management approaches (Brown & Kaewkitipong, 2009; Lee-Ross & Johns, 1997; Moriaty, Jones, Rowley & Kupiec-Teahan, 2008), it remains unclear whether individuals managing hotels of different sizes differ in terms of their views regarding the CSFs for their particular sector, thus the potential of this study to fill this research gap (Avcikurt et al. 2011). This study was therefore carried out to deepen the scientific debate about this overlooked research area. Specifically, it aims to contribute to the current body of knowledge by answering the following research questions:

RQ1: What are the digital-based CSFs that hotel managers and owners consider necessary for their business to be successful?

RQ2: Do hotel managers and owners' views with respect to digital-based CSFs differ significantly according to hotel size (small, medium, and large)?

RQ3: Do hotel managers and owners' views about digital-based CSFs significantly differ according to their level of education and work experience?

For the purposes of the study, 367 responses from managers operating in the Italian hotel sector were collected in the period September–October 2021; the data was subjected to factor analysis and a series of ANOVA and independent *t*-tests. The research findings are helpful to enhance the scientific understanding of the digital-based CSFs in the hotel sector, and to ascertain whether the subjective characteristics of the hotel managers and owners (level of education and work experience) and their organisation's characteristics (*i.e.,* hotel size) significantly moderate their views. The findings are beneficial to policymakers, destination marketers, hospitality schools, and universities that seek to support the digital transformation of the hotel sector.

2. Literature review

Existing literature provides several definitions of SMEs. According to Atkins and Lowe (1997), 40 different definitions of SMEs have been record-

ed in the literature, and there typically seems to be very little uniformity in the standards used to describe these businesses across different countries (Thomas, Shaw & Page, 2011; Thomas, 2000). The widely used definition of small firms proposed by the European Commission in 1996 that emphasizes the number of employee classifications of micro (0–9), small (10–49), medium (50–249), and large (250) is one of many that Thomas (2000) thoroughly analyses and explains. Regarding the hotel sector, the World Tourism Organization (2000) defines a small hotel as one that normally offers fewer than 50 beds, hires fewer than ten workers, and serves the bottom end of the market. According to Moutinho (1990), and Buhalis (1995), small and medium hotels have fewer than 50 rooms and employ fewer than 10 workers. Yet, according to Ingram, Jamieson, Lynch and Bent (2000) and Ahmad (2015), a small hotel has fewer than 50 rooms, a medium-sized hotel provides 51–100 rooms, and a large hotel offers more than 100 rooms. Other researchers suggest that, when classifying businesses, quantitative indicators (e.g., number of rooms and employees, gross profit, etc.) should be complemented by qualitative, intangible, characteristics (such as ownership structure, business orientation, and motivation) (Jay & Schaper, 2003; Morrison & Conway, 2007). For the purpose of our study, we will use quantitative indicators (*i.e.*, number of rooms), following the definitions provided by Ingram et al. (2000) and Ahmad (2015).

Several studies have been conducted to analyse the CSFs in the hotel sector (Ahmad, 2014; Avchikurt et al. 2011; Putra & Law, 2023; Wang, Wang & Horng, 2015). Typically, owning a website and effectively using social media have been considered important and effective factors in determining success (Cioppi, Curina, Forlani & Pencarelli, 2016; Pencarelli, Cioppi & Forlani, 2015); in fact, the online presence and visibility, for example, was found to influence the hotel occupancy rates significantly and favourably (Teodoro et al. 2017). Marais, Du Plessis & Saayman (2017) identified seven CSFs, namely, home atmosphere, room facilities, other facilities, service, cleanliness, location, and value for money. Putra and Law (2023), and Manthiou and Klaus (2022) suggested that marketing promotion strategies, client relationships, training, innovation strategies, human resource development, hotel operation management, capital expenditures, and property management systems should be considered the CSFs for virtual hotel operators who partner with small- to medium-sized hotels. Yet, Avchikurt et al. (2011) identified efficient use of the internet and social media, service quality, financial performance, and marketing as the CSFs for small hotels. The author also found that hotel managers have different views about CSFs based on their level of education and work experience. The relevance of the internet as a marketing tool for the hotel sector is corroborated by Öğüt and Onur Taş (2012), who found that roughly 80% of hotels advertise their properties online. Similarly, they are consistent with a recent survey con-

ducted by *Internet Week,* which shows that more than two-thirds of travel and hospitality organizations consider the internet a significant competitive weapon in their industry, and almost 60% describe it as a significant tool for attracting new clients (Li, Peng, Jiang & Law, 2017; Li, Wong & Luk, 2006). Internet usage also provides hotels with the opportunity to reduce their dependence on intermediaries, allowing them to become nimbler, more flexible, and more effective in identifying and creating niche-market products (ILO, 2001) and getting in touch with their target markets.

In recent years, all industries, including tourism, hospitality, and culture, have experienced the uprise of the so-called 4.0 technologies (Internet of Things devices, big data analytics, location-based services, artificial intelligence, blockchain, robots, virtual assistants, chatbots, augmented reality, virtual reality, and mixed reality), with all of them having contributed to a shift in the way businesses function and in the way the customer experience can be shaped (Hoyer, Kroschke, Schmitt, Kraume & Shankar 2020; Ivanov, Seyitoğlu & Markova 2020; Stankov & Gretzel, 2020).

The extent to which people will embrace VR and AR has been investigated in several settings (Han, Tom Dieck & Jung, 2019a; Jung, Lee, Chung & Tom Dieck 2018; Vishwakarma, Mukherjee & Datta, 2020). Existing literature considers VR to be a powerful hotel marketing tool (Pestek & Sarvan, 2021) and training platform (Fiala et al., 2022; Rohlíková et al 2021; Velev & Zlateva, 2017). Several studies have analysed how VR, AR, and mixed reality (MR) affect consumers' decision-making and related responses, as well as their role in enriching the consumption experience and advertising efforts (Han, Weber, Bastiaansen, Mitas & Lub, 2019b). For example, in the specific context of the hotel sector, VR has been found to facilitate greater information retrieval, with consumers considering it to be particularly helpful in pre-purchase information gathering (Murphy, Hofacker & Gretzel, 2017). Other studies have found that the use of the virtual hotel experience increases the probability that the customer will book their travel accommodations (Israel, Zerres & Tscheulin, 2019). Additionally, VR advertising has been found to produce better immediate effects than traditional commercials (Leung, Lyu & Bai, 2020). While extensive research has been conducted on consumers' views and attitudes towards VR and AR, less attention has been devoted to investigating the opinions hotel managers hold regarding the extent to which these technologies can be considered as CSFs.

The service sector is not certainly new to automation and roboticization (Wirtz et al., 2018). According to existing literature (Belanche, Casaló, Flavián & Schepers, 2020; Orea-Giner, Fuentes-Moraleda, Villacé-Molinero, Muñoz-Mazón & Calero-Sanz, 2022;), automation increases productivity, service capacity, provides consistent service quality, reduces costs, improves financial results, and increases business competitiveness. Compa-

nies in the tourism and hospitality industries have begun to deploy robots for a variety of jobs, including cleaning, room service, entertaining guests, or informational tasks (Ivanov & Webster, 2019a; Lukanova & Ilieva, 2019). Similarly, hotels are relying - even if to a lesser extent when compared to organizations in other sectors (Ukpabi, Aslam, & Karjaluoto 2019) - on chatbots to plan and implement their service design and to be in touch with their guests (Gursoy & Chi, 2020; Ivanov et al. 2020; Lasek & Jessa, 2013), as well as on artificial intelligence (AI) to manage data analytics (e.g., automating big data analytics, using AI-based revenue management systems to support pricing strategies, etc.) (Brotherton & Mooney, 1992; Smrutirekha, Sahoo & Kark, 2022). A relatively recent study adopting a supply-side perspective (Ivanov et al. 2020) in the hotel sector has reported hotel managers being convinced that robots could be appropriate for certain tasks but not for others, where human employees cannot be replaced. The study also found that certain subjective characteristics of respondents (*i.e.,* age, work experience) and objective characteristics of the business (*i.e.,* star category) play little role in their perceptions of service robots and robots' potential impact on a hotel's business. Additionally, it found the managers of the largest properties to be a bit more sceptical toward the application of robots for some tasks than the managers of smaller hotels. Compared to their counterparts in smaller hotels, the managers of bigger hotels were more concerned about the fact that robots could, in fact, decrease the quality of the service they provide.

3. Methodology

The Italian hospitality sector has been severely impacted by COVID-19, as it has happened in any other part of the world (Del Chiappa, Bregoli & Fotiadis, 2021; Fabiani, Schivardi & Trento, 2005; Godovykh, Baker & Fyall, 2022). According to ISTAT, in 2019 the Italian hotel sector counted a total of 97,798,618 arrivals and 280,937,897 overnight stays, while in 2020 the sector registered 39,026,874 arrivals and 123,266,144 overnight stays.

This said, the Italian overall hotel supply declined by 621 hotels in 2021 when compared to 2020 (Table 1), with the highest decline being registered by hotels with up to 24 rooms (Table 2).

Table 1. Italian hotel sector by number of establishments and rooms

SL	Number of Establishments (2020)	Number of Rooms (2020)	Number of Establishments (2021)	Number of Rooms (2021)
1 star	2,597	33,236	2,398	30,816
2 stars	5,451	90,575	5,110	84,371
3 stars	15,128	460,376	14,837	446,714
4 stars	6,074	388,039	6,217	390,782
5 stars	554	39,036	601	41,224
Hotel residence	2,926	81,496	2,946	79,685
TOTAL	32,730	1,092,758	32,109	1,073,592

Source: Italian National Statistics Office (www.istat.it)

Table 2. Number of hotel establishments by size

SL	2019	2021	Variation 2019-2021
≤24	17,772	17,432	-340
25-99	13,500	13,232	-268
≥100	1,458	1,445	-13
TOTAL	32,730	32,109	621

Source: Italian National Statistics Office (www.istat.it)

As Table 2 shows, the Italian hotel sector is predominantly made up of SMEs (around 95.5%, both in 2019 and 2021). Furthermore, according to Horwath (2022), it is also characterized by a weak presence of chain hotels in the market (3.9%).

3.1 Measurement Scale and Questionnaire Design

For the purposes of the study, the survey instrument was developed according to a two-step structured approach. First, digital-based items were sourced from existing studies devoted to DCSFs in the hotel sector, namely Avcikurt et al. (2011). Second, a group of hotel managers and owners were consulted to verify and validate the survey and to suggest potential integrations and changes to acknowledge the uprising of 4.0 technologies, thus allowing them to adopt a theory-in-use approach (Zaltman, LeMasters & Heffring,1982). By doing this, a list of 17 different digital-based CSFs was identified. The survey was divided in two parts. In the first part, individuals were asked to provide general information about their sociodemographic (*i.e.*, gender, age, level of education) and professional profile (*i.e.*, organizational position and experience in the hotel sector), as well as the

business they work in (*i.e.*, hotel category, room number). The second part asked participants to assess the importance they give to a list of statements used to identify the 17 different digital-based CSFs; a 5-point Likert scale was used to indicate their answers (1 = not at all important, 5 = extremely important). The original English version was translated into Italian, and then translated back into English (Fotiadis, Yeh & Huan, 2016; Van de Vijver & Tanzer, 2004). Data collection took place in the period September–October 2021. The survey was distributed via email to 5,000 hotels in all 20 regions of Italy. At the end of the data collection, a total of 367 completed questionnaires were returned, thus representing a response rate of 7.34%, which can be considered acceptable given that response rates of less than 10% are considered the norm in SMEs-related data collection (Jay & Schaper, 2003). The data were coded and analysed using SPSS (version 19.0), and then descriptive analysis, factor analysis, and a series of ANOVA analyses and *t*-tests were run for the purposes of the study.

4. Findings

4.1 Characteristics of Respondents and Hotels

Table 3 provide general information about the sample. Most respondents in the sample were male (54.5%). Nearly half (48.4%) were between the ages of 46 and 55, with those between the ages of 36 and 45 coming in second (24.4%). Most respondents (45.4%) had a bachelor's degree, then a master's or doctorate (9.8%), high school (3.8%), and other (3.4%).

In terms of employment status, the sample includes general managers (23.9%), midlevel managers (18.2%), hotel owners (51.6%), and others (6.3%). Regarding work experience, 87% of respondents reported having a work experience of five years or more, followed by 8.2% with three to five years of experience and 4.8% with fewer than three years of experience. In addition, the bulk of hotels (50.7%) had three stars, followed by four stars (34%), two stars (9%), five stars (5.2%), and one star (1.1%).

Table 3. Characteristics of the sample

Variable	%	Variable	%
Gender			
Male	54.5	General Manager	23.9
Female	45.5	Mid-level manager	18.2
Age		Other	6.3
18-25	3.6	**Experience**	

26-35	16.4	< 3 years	4.8
36-45	24.4	3-5 years	8.2
46-55	29.0	> 5 years	87
56-65	21.9	Hotel category	
66 or above	4.7	1 star	1.1
Level of education		2 stars	9.0
Secondary school	3.8	3 stars	50.7
High School	45.4	4 stars	34
University Degree	37.7	5 stars	5.2
Master/PhD	9.8	**Hotel size (rooms)**	
Other	3.3	< 50 (small)	66.5
Management position		51-100 (mid-size)	23.1
Owner	51.6	101-150 (big)	10.4

Most hotels own fewer than 50 rooms (66.5%), followed by hotels with 51 to 100 rooms (23.1%), and last, hotels with 101 to 150 rooms (10.4%). Table 4 shows the mean value and the standard deviation for each item depicting DCSFs.

Based on the study findings, it appears that the most important DCSFs are the Internet and social media, online review management, and big data analytics. The usage of artificial intelligence (both in revenue management systems and in automating big data analytics) and virtual reality (virtual tours on the official hotel website, in-room virtual tours, and virtual tours at fairs and exhibitions) are just slightly considered relevant for business success (Revfine, 2020). Ultimately, respondents appear to assign little relevance to using virtual reality to train employees or to using chatbots, smart concierges, and service robots to automate certain hotel operations.

Table 4. Critical Success Digital Factors: Mean Importance Ratings and Standard Deviation

Description	M	SD
A1. Accessing customer via internet	4.80	0.511
A2. Internet usage level	4.55	0.667
A3. Degree of internet usage for communication	4.41	0.763
A4. Using websites for promotion	4.21	0.884
A5. Accessing target market directly by e-mail	4.17	0.996
A6. Using social media	4.10	0.893
A7. Managing online comments and reviews	3.89	1.173
A8. Using Big Data analytics to support decision making	3.80	1.017
A9. Using artificial intelligence-based revenue management systems	3.45	1.138
A10. Using artificial intelligence to automatize Big Data analytics	3.35	1.148

A11. Virtual tours to enhance the website's user experience	3.27	1.146
A12. In-room virtual tours to promote tour and activities in the destination	3.26	1.178
A13. Virtual tours to promote the hotel at fairs & exhibitions	3.25	1.180
A14. Using virtual reality to train employees	2.46	1.200
A15. Using chatbot	2.33	1.158
A16. Using smart concierge	2.20	1.158
A17. Robot usage to automatized certain hotel operations	2.13	1.140

All this seems to suggest that hotel managers and owners are far from fully recognizing the role that technology 4.0 might play in making their businesses successful.

Exploratory factor analysis (principal components analysis, – PCA) was conducted to reveal the underlying factors in the data. This procedure allowed us to identify four factors explaining 59.12% of the total variance (Table 5).

The KMO index (Kaiser_Myer_Olkin = 0.875) and Bartlett's test of sphericity (chi-square = 2674.810, p-value <0.0001) confirm that the results are appropriate to explain the data. Cronbach's alpha was then calculated to test the reliability of the extracted factors; all values are 0.7 or higher, thus suggesting that the factors are reliable (Hair, 2010). Two items were eliminated because of their low factor loadings (i.e., < 0.60: Hair, Anderson & Tatham, 1998), namely: "Managing online comments and reviews" and "Using virtual reality to train staff."

"Internet and social media usage" (35.6% of total variance) includes items related to the usage of the internet to get in touch with target markets (*i.e.*, "Accessing Customers Via the Internet," "Internet Usage Level," "Internet Communication Usage," "Using Websites for Promotion," "Accessing Target Market Directly Via E-mail," and "Using Social Media.").

Table 5. Results of Exploratory factor Analysis (EFA)

	Factor Loadings	Eigenvalues	Variance Explained (%)	Cumulated Variance (%)	Cronbach's Alpha
F1 – Internet and social media		5.815	35.61	35.61	0.774
A2. Internet usage level	0.716				
A3. Degree of internet usage for communication	0.709				
A1. Accessing customer via internet	0.674				
A4. Using websites for promotion	0.632				
A6. Using social media	0.432				
A5. Accessing target market directly by e-mail	0.422				
F2 – Virtual reality		2.204	11.04	46.65	0.904
A12. In-room virtual tours usage promote tour and activities in the destination	0.797				
A13. Virtual tours usage to promote the hotel at fairs & exhibitions	0.777				
A11. Virtual tours usage to enhance the website's user experience	0.727				
F3 – (Ro)bots		1.144	5.88	52.53	0.835
A16. Using smart concierge	0.860				
A15. Using chatbot	0.742				
A17. Robot usage to automatized certain hotel operations	0.647				
F4 – Artificial intelligence in data analytics		1.127	6.59	59.12	0.871
A10. Using artificial intelligence to automatize Big Data analytics	0.858				
A8. Using Big Data analytics to support decision making	0.684				
A9. Using artificial intelligence-based revenue management systems	0.676				
KMO: 0.875 - Bartlett test – Chi-squared: 2674.810; p-value: 0.000					

"Virtual reality" (11.04% of the total variance) includes items related to the use of virtual tours as B2C and B2B marketing tools, namely: "Virtual tour usage to enhance the website's user experience", "In-room virtual tour usage to promote tours and activities in the destination," and "Virtual tour usage to promote the hotel at fairs and expositions."

"(Ro)bots" (5.88% of the total variance) consists of three components: "using smart concierge," "using chatbots," and "robot usage to automate certain hotel functions."

"Artificial intelligence in data analytics" (6.59% of the total variance) consists of three items, namely: "Using big data analytics to support decision making," "using artificial intelligence to automate big data analytics," and "using artificial intelligence-based revenue management systems." However, it is interesting to note that respondents rated (ro)bots as the least relevant factor for business success. This occurs even though AI assistants, smart booking systems, and AI-based customer decision assistance are considered digitally-based key factors for the SME hotel business (Hall, 2009; Ivanov & Webster, 2019b). In fact, using efficient automated information, decision-making support, and an effective management system can help the business increase their market share and client demand (Ivanov et al., 2020; Revfine, 2019), increase customer satisfaction (Javed, Rashidin & Jian, 2021; Samala, Katkam, Bellamkonda & Rodriguez, 2022) and make the business successful.

Echoing existing literature (Brown & Kaewkitipong, 2009; Lee-Ross & Johns, 1997; Lee, Kim, Choi & Lee, 2009), our findings show that hotel managers and owners working in hotels of different sizes have different views about the relevance of DCSFs. Specifically, those working in mid-size and big hotels scored higher than their counterparts for all the items. However, when the data was subjected to an ANOVA test (both for the factor score and the mean value of each item), significant differences based on the hotel size were reported, just regarding the views towards "artificial intelligence in data analytics" ($F=3.257$, p-value$= 0.040$) and one of its related items, namely, "using artificial intelligence to automate big data analytics (A10 - $F=4.062$, p-value$= 0.018$) (Table 6).

Table 6. ANOVA by Size

	Small hotels	Mid-size hotels	Big hotels	F	Sig.
F1 – Internet and social media				1.166	0.313
A2. Internet usage level	4.51	4.65	4.55	1.522	0.220
A3. Degree of internet usage for communication	4.38	4.46	4.50	0.634	0.531
A1. Accessing customer via internet	4.77	4.81	4.92	1.406	0.246
A4. Using websites for promotion	4.15	4.36	4.26	1.868	0.156
A6. Using social media	4.07	4.15	4.24	0.765	0.466
A5. Accessing target market directly by e-mail	4.09	4.37	4.16	2.656	0.072
F2 – Virtual reality				1.282	0.279
A12. In-room virtual tours usage promote tour and activities in the destination	3.22	3.23	3.58	1.549	0.214
A13. Virtual tours usage to promote the hotel at fairs & exhibitions	3.18	3.32	3.51	1.523	0.219
A11. Virtual tours usage to enhance the website's user experience	3.27	3.19	3.47	.795	0.452
F3 – (Ro)bots				1.189	0.306
A16. Using smart concierge	2.15	2.37	2.19	1.119	0.328
A15. Using chatbot	2.25	2.47	2.53	1.699	0.184
A17. Robot usage to automatized certain hotel operations	2.04	2.33	2.24	2.178	0.115
F4 – Artificial intelligence in data analytics				3.257	0.040
A10. Using artificial intelligence to automatize Big Data analytics	3.22	3.54	3.66	4.062	0.018
A8. Using Big Data analytics to support decision making	3.72	3.89	4.08	2.621	0.074
A9. Using artificial intelligence-based revenue management systems	3.37	3.57	3.71	2.133	0.120

ANOVA tests were also run to check whether significant differences exist based on the work experience respondents own in the hotel sector (experienced: > 5 years, mid-experienced: 3-5 years, and less experienced: < 3) (table 7).

Results indicate that significant differences exist just for the factor "internet and social media" (F= 4.468, p-value = 0.005) and four of its items, namely: degree of internet usage for communication (F=4.181, p-value= 0.16), using websites for promotion (F=5.876, p-value= 0.003), using social media (F= 5.810, p-value= 0.003) and accessing the target market directly by email (F= 3.727, p-value=0.25) (Table 7). More specifically, experienced managers and owners scored higher for all the items when compared to their counterparts.

While hotel managers' and owners' views did not differ significantly

regarding (Ro)bots, significant differences were found for one of its items, namely, "using chatbots" (F = 3.312, p-value = 0.038). Specifically, experienced managers and owners scored higher (M=2.78) than their counterparts (M=2.70, M=2.27). Overall, these findings confirm that even in the specific context of DCSFs, work experience matters, thus confirming prior findings from studies analyzing CSFs in the hotel sector (Avcikurt et al., 2011; Ngai, Chemg & Ho, 2004; Seyitoğlu & Ivanov, 2021).

Table 7. ANOVA by experience

	Experienced	Mid-experienced	Less experienced	F	Sig.
F1 – Internet and social media				4.468	0.005
A2. Internet usage level	4.67	4.67	4.53	0.900	0.407
A3. Degree of internet usage for communication	4.72	4.70	4.37	4.181	0.016
A1. Accessing customer via internet	4.89	4.93	4.78	1.595	0.204
A4. Using websites for promotion	4.67	4.57	4.15	5.786	0.003
A6. Using social media	4.61	4.43	4.04	5.810	0.003
A5. Accessing target market directly by e-mail	4.33	4.60	4.12	3.727	0.025
F2 – Virtual reality				2.287	0.103
A12. In-room virtual tours usage promote tour and activities in the destination	3.61	3.07	3.26	1.204	0.301
A13. Virtual tours usage to promote the hotel at fairs & exhibitions	3.61	3.27	3.22	0.928	0.396
A11. Virtual tours usage to enhance the website's user experience	3.61	2.93	3.29	2.142	0.119
F3 – (Ro)bots				0.525	0.592
A16. Using smart concierge	2.44	2.10	2.20	0.508	0.602
A15. Using chatbot	2.78	2.70	2.27	3.312	0.038
A17. Robot usage to automatized certain hotel operations	2.39	2.00	2.13	0.660	0.518
F4 – Artificial intelligence in data analytics				2.169	0.116
A10. Using artificial intelligence to automatize Big Data analytics	3.56	3.66	3.31	1.478	0.229
A8. Using Big Data analytics to support decision making	4.00	4.17	3.75	2.647	0.072

Finally, a series of independent *t*-tests was run to investigate whether significant differences exist based on the level of education of respondents (*i.e.*, "with a university degree" versus "without a university degree") (table 8).

Results revealed that significant differences exist just regarding "internet and social media" (t=2.065, p-value = 0.04) and one of its related items, namely, "accessing customers via the internet (t=2.988, p-value= 0.003).

Table 8. Results of independent t-test by education

	With University	Without University	t	Sig.
F1 – Internet and social media			2.065	0.04
A2. Internet usage level	4.59	4.52	0.982	0.327
A3. Degree of internet usage for communication	4.46	4.37	1.118	0.264
A1. Accessing customer via internet	4.88	4.72	2.988	0.003
A4. Using websites for promotion	4.21	4.21	-0.015	0.988
A6. Using social media	4.07	4.14	-0.754	0.451
A5. Accessing target market directly by e-mail	4.17	4.16	0.108	0.914
F2 – Virtual reality			-3.021	0.003
A12. In-room virtual tours usage to promote tour and activities in the destination	3.11	3.4	-2.407	0.017
A13. Virtual tours usage to promote the hotel at fairs & exhibitions	3.09	3.39	-2.436	0.015
A11. Virtual tours usage to enhance the website's user experience	3.13	3.41	-2.322	0.021
F3 – (Ro)bots			-1.157	0.248
A16. Using smart concierge	2.07	2.34	-2.204	0.028
A15. Using chatbot	2.33	2.34	-0.06	0.952
A17. Robot usage to automatized certain hotel operations	2.09	2.17	-0.686	0.493
F4 – Artificial intelligence in data analytics			-0.617	0.537
A10. Using artificial intelligence to automatize Big Data analytics	3.25	3.43	-1.491	0.137
A8. Using Big Data analytics to support decision making	3.79	3.8	-0.086	0.932
A9. Using artificial intelligence-based revenue management systems	3.45	3.46	-0.059	0.953

Specifically, respondents with a university degree scored higher on this item. Moreover, significant differences were reported to exist in regard to "Virtual reality" (t=-3.201, p-value=0.003) and all its composing items, namely: "in-room virtual tours usage to promote tours and activities in the destination" (t=-2.407, p-value= 0.017), "virtual tours usage to promote the hotel at fairs and exhibitions" (t=-2.436, p-value=0.015) and "virtual tours usage to enhance the website's user experience" (t=-2.322, p-value= 0.021). Specifically, respondents with a university degree are more convinced about the relevance of using in-room virtual tours to promote

tours and activities in the destination (M=3.11) when compared to their counterparts (M=3.4). However, respondents with a higher level of education scored lower regarding the items related to the usage of virtual tours to promote the hotel at fairs and exhibitions (M= 3.39 *versus* M=3.09) and to enhance the website's user experience (M=3.41 *versus* M=3.13). While hotel managers' and owners' views did not differ significantly regarding "(Ro)bots" as a factor, significant differences were found regarding one of its items, namely, "using smart concierge" (t= -2.204, p-value = 0.028). Specifically, respondents with the lowest level of education scored higher (M=2.34) than their counterparts (M=2.07). These findings confirm that the level of education is a crucial aspect in determining and implementing digital-based CSFs (Chiappetta Jabbour, Mauricio & Jabbour, 2017).

5. Conclusion

The CSF approach is a top-down methodology for planning based on the key information requirements of top management (Hansen & Eringa, 1998). Such an approach has been applied in this study to a sample of 367 hotel managers in Italy. Most of the existing studies devoted to analysing the critical success factors in the hotel sector from a supply-side perspective have been conducted in the US, UK, Asia Pacific region, The Netherlands, and Turkey and have neglected to compare the views of hotel managers working in hotels of different size categories (Martin, 2004; Morrison et al. 2010). This study contributes to the current body of knowledge by presenting and discussing the findings of empirical research conducted on a sample of Italian hotels with the aim of ascertaining whether the subjective characteristics of the hotel managers and owners (level of education and work experience) and the organisational characteristics (*i.e.,* hotel size) can significantly moderate their views towards different digital-based CSFs.

Based on the respondents' assessments, the study findings show that the most important aspects determining hotel success are the Internet and social media, online review management, and big data analytics. The usage of artificial intelligence (both in revenue management systems and in automating big data analytics) and virtual reality (virtual tours on the official hotel website, in-room virtual tours, and virtual tours at fairs and exhibitions) are considered to be slightly relevant for business success. Similarly, little importance is given to virtual reality to train employees, and even less importance is awarded to using chatbots, smart concierges, and service robots to automate certain hotel operations. Hence, the study suggests that hotels suffer from a kind of marketing myopia in recognizing the role that the 4.0 technologies might have for their business success.

Furthermore, the study identified four digital-based critical success fac-

tors, namely: "Internet and social media usage," "Virtual reality," "(Ro) bots," and "Artificial intelligence in data analytics".

While the views of the hotel managers towards the aforementioned DCSFs vary depending on their subjective and organisational characteristics, only a relatively small number of differences were found to be statistically significant differences based on these variables.

Specifically, significant differences based on the hotel size were reported to exist just regarding the views towards "artificial intelligence in data analytics" and one of its related items, namely, "using artificial intelligence to automate big data analytics (Alma Çallı, Çallı, Sarı Çallı & Çallı, 2023). This highlights that hotel managers hold quite similar views toward DCSFs regardless of hotel size, thus somehow contradicting previous studies suggesting that SMEs and big hotels differ in terms of marketing and management (Brown & Kaewkitipong, 2009; Del Chiappa, 2022; Lee-Ross & Johns, 1997). Yet, this study finds that hotel managers are fully aware of the importance of the internet and social media, regardless of the size of the business within which they work (Li et al., 2017); this appears to be in line with previous studies highlighting that hotel size matters somewhat in investing in internet and social media but not to a significant extent (Cioppi et al., 2016; Pencarelli et al., 2015).

Furthermore, these findings somewhat support prior literature (Ivanov et al. 2020), which found that hotel managers' perceptions of robots rarely differ significantly based on the hotel size. Yet, as found in prior studies devoted to non-digital-based critical success factors (Avcikurt et al., 2011; Prakash, 2007), several significant differences were observed among respondents with respect to different levels of education and work experience, with hotel managers having higher education and longer work experience in the sector being more aware of the relevance of DCSFs. This result somewhat echoes prior studies, which found that the work experience of hotel managers significantly moderated their views about the relevance of robotics in their business (Ivanov et al. 2020). It could be assumed that higher levels of education and work experience might also render individuals working within the sector more trained. In this vein, our findings seem to offer further evidence that the adoption of digital technologies and the awareness of their relevance as competitive weapons depend on adoption, and novel technology (robots) depends on the training of personnel (Vladimirov, 2015; Wang et al., 2010).

Theoretical contribution

From a theoretical point of view, our findings deepen the scientific debate on CSFs (Avcikurt et al. 2011), more precisely on DCSFs related to

different types of technologies, explicitly contrasting the views that hotel managers own based on their subjective characteristics (*i.e.*, level of education and work experience) and the size of the business in which they work. In doing so, the study also adds to the existing literature analyzing the influence that the company size might have on marketing and management approaches (Brown & Kaewkitipong, 2009): in this, it shows that the hotel managers' views toward DCSFs are, after all, quite similar regardless of hotel size (Cioppi et al., 2016; Ivanov et al., 2020; Pencarelli et al., 2015). Broadly, the study advances our knowledge into the present state of digital transformation in the hospitality sector (Lam & law, 2019) shedding light on a country (i.e., Italy) that is understudied in this regard. Thus, our findings suggest that it is important that managers realize the importance of information and communication technology and 4.0 technologies, especially certain types, to maintain and increase their market share and business efficiency and success. In particular, our findings indicate that while the digital transformation is widely discussed both in academic research and in society as being relevant for business success across sectors, many of its tools are not yet appreciated (e.g., Busulwa, Pickering & Mao, 2022) by Italian hotel managers as key success factors. Hence, investment in these areas should be a top priority.

Managerial implications

Overall, the study results are also beneficial to policymakers, destination marketers, vocational training centres, hospitality schools, associations, and universities attempting to support the digital transformation of the hotel sector. First, our findings seem to suggest the need for these stakeholders to make a synergetic effort to further create and promote education and training programs, attempting to make actual and prospective hotel managers more aware of the key role that 4.0 technologies play in business success, thus helping to close the gap between research and its practical implementation. For example, although there are some excellent examples, Italian universities need to incorporate 4.0 technologies more actively in their curricula. For example, they might develop a separate Master program on tourism and hospitality 4.0, a master's program in Hospitality Management with a specialization in 4.0 technologies, a stand-alone module taught at undergraduate and master's levels, or a module targeted at practitioners. Furthermore, considering that not all the factors perceived as critical may remain constant over time and space (Avcikurt et al. 2011), our study also suggests that hotel managers' views towards DCSFs must be monitored over time. Since the hotel managers may be discouraged by the perception that the new technologies might be unaffordable, our findings

also suggest an opportunity for policymakers to reduce these financial barriers, whether real or perceived (e.g., by providing financial resources, offering grants, fiscal incentives and credit facilitation, etc). Destination Management Organizations (DMOs) and/or hotel associations might consider the possibility to negotiate the prices of certain technologies (e.g., sentiment analysis tools, dig data analytics and platforms, etc) with suppliers to gain the possibility to offer them at lower and more convenient prices to their hotel associates. Lastly, DMOs, hotel associations, and individual hotels might consider the opportunity to partner with hospitality schools, universities, and technical institutes to create internship opportunities, which would help recruit employees who are highly trained in the use of different types of technologies and who recognize the importance of these tools for competitive advantage.

Limitations and future research directions

Besides its contribution to both the current body of knowledge and practice, the study has several limitations. First, the study is based on a convenience sample and is site-specific (*i.e.,* Italy), thus rendering the findings hardly generalizable. Future studies might attempt to achieve a representative sample by collecting data from different countries to conduct cross-country analyses. Further, the study was conducted during a period somewhat impacted by the COVID pandemic. Considering that the COVID pandemic has been considered an accelerator of digital transformation (António & Rita, 2021), the study could be replicated over time to assess whether the views of the Italian hotel managers and owners have changed over time (Schengenvisainfo, 2023) Moreover, this study did not check whether significant differences might exist based on other business characteristics (e.g., budget hotel versus luxury hotel, leisure versus business hotel, hotel culture, life stage of hotels, star category) which, as suggested by extant literature (Avcikurt et al., 2011; Cioppi et al., 2016; Peters & Buhalis, 2013), might moderate the hotel managers' and owners' views towards DCSFs. Similarly, the study did not measure the moderating effect of subjective variables, such as the respondents' familiarity with the different types of technologies; considering such a moderating effect would have also helped to eliminate/reduce the possible bias that the survey might have introduced when asking hotel managers to assess technologies that are to some extent known and already used (e.g., the official website) and those that are still unused and not properly widespread (e.g., robots). Future studies should be conducted to properly incorporate these variables. Finally, this study analysed the perceptions of Italian hotel managers regarding DBCSFs but neglected to consider the customers' and employ-

ees' views. A comparative analysis of DBCSFs from supply- and demand-side perspectives could be conducted in the future to ascertain whether a "tuning gap" (external and/or internal) exists in the way hotel managers, owners, employees, and customers perceive the relevance of such DCSFs.

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