

Development and Research Status of Hotel Digital Operation in China

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Abstract: Digital operation is the only way for China's hotel industry to adapt to the WEB 3.0 era in the future by reducing costs and increasing efficiency. This paper systematically combs the causes of the development of digital operation in China's hotel industry and analyzes the current situation and main problems of the development of digital operation in China from two dimensions of enterprise operation and technology. The motivation for the digital development of hotel operations mainly stems from the practical needs of business transformation and customer relationship optimization. With the goal of optimizing business processes and improving profit by relying on digital technology, it is committed to improving customer experience. The research shows that through digital empowerment, the sustainable development of digital operation of the hotel industry will ultimately promote the precise quantification of enterprise business objectives, the continuous increase of digital service products, and the innovation of customer experience perception service. At present, the development of digital operations in the hotel industry is faced with practical difficulties and challenges such as insufficient investment in digital projects and limited professional talents. In contrast to the rapid development of the industry, the current theoretical research literature on the digital operation of the hotel industry mainly focuses on the characteristics and motivation of the hotel digital operation, but its research still has the shortcomings of lagging research and superficial problems. The article suggests that the future research of the digital operation of hotels in China should be rooted in China's economic reality and deepened from two aspects of real industry cases and the international localization process.

Keywords: Hotel; Digital operation; Digital products; Digital technology

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1. Introduction

With the development of digital technology, the upgrading of digital technology has a significant impact on the development of various industries and the market environment ^[1]. As a labor-intensive traditional industry, the hotel has long faced the problems of low talent literacy and high operating costs, in which digital operation can provide new ideas for the development of hotels ^[2-4]. At present, foreign research on the digital operation of hotels is just

emerging, while the relevant research in China is scarce. The existing research mainly focuses on the concept, characteristics, influencing factors, and other aspects of the digital operation of hotels, and the research mostly stays in the surface analysis. There is no clear answer to the core factors, the dimensional composition of the factors, and the specific action paths affecting the digital operation of hotels in China. Therefore, in the theoretical research for the system of the development of the origin, connotation, and industry practice, fully analyze the influencing factors of the development of China hotel digital operation, determine the mechanism of various factors, and help managers combined with China's national conditions to explore the digital development direction, to improve the actual effect of digital operation, has become the key to the development of the hotel industry with high quality.

2. The source of the digital operation and development of hotels in China

In the course of the hotel development that has lasted for thousands of years, the promotion of various new technologies has formed the iteration of the contemporary and differentiated operation concept of the hotel industry. The application of digital technology in hotels originated from the use of the first hotel information system in the world in 1970^[5-6]. From the perspective of occurrence, the promotion of hotel digital operation is mainly based on the combination of four internal and external factors in **Table 1**.

Table 1. Analysis of the internal and external causes of the hotel's digital operation

		Change needs
Endopathic (inevitability)	Customer-centered full-service chain digital ecology is driven by the competition in the hotel industry	The transformation of the traditional service industry to the digital operation mode
External cause (necessity)	Mobile communications, cloud computing, big data, AI, face recognition, blockchain, the Internet of Things, and other new technologies to promote the application and technology of the traditional service industry.	Digital operation drives the high-quality development of the hotel industry to improve the competitiveness of the hotel industry, which is the need of the national modernization strategy
		Trigger conditions

Digital operation refers to surpassing the traditional operation mode, using various digital tools to manage daily business, summarize and analyze business data, plan the future development direction of enterprises, and use data and new technologies to reshape all production links, upgrade user experience, and improve operational efficiency^[7-8]. From this point of view, the hotel digital operation is the use of information technology, artificial intelligence and management information system (MIS) and other technical means and tools to the traditional hotel industry business processes and operation management link through new technology and data processing function remodeling and optimization, to realize the hotel operation management informatization with digital, intelligent, and diversified platform, to improve hotel operation management efficiency and customer experience of the new management mode. At present, the digital operation of the hotel is mainly reflected in four aspects: product digitalization, online business process, intelligent data application, and ecological competitive advantages.

3. Digital development process and industry status of hotels in China

3.1. Digital development process of the hotel industry

3.1.1. Early budding stage

In 1979, China developed the first hotel management software with a query function, which created the first hotel

management system in China. In 1990, CSHIS was soft-launched. In June 1993, Hangzhou West Lake software developed Foxhis system and domestic hotel management system DOS version. The Windows version was launched in 1998. Beijing Changzhou Network System Engineering Technology Co., Ltd. officially entered the hotel information system research and development field in 1998. In general, in the 1G and 2G era before 1998, China's hotel industry was still in the embryonic stage of informatization.

3.1.2. Informatization development stage

The development of hotel informatization in China is mainly concentrated from 1999 to 2017, which is the beginning of O2O, focusing on the introduction and application of big data and wireless technology to realize mobile and online development.

In terms of hotel and information technology iteration, major OTA platforms were established around 2000, which promoted the development of online booking in hotels. In 2007, China's first direct connection technology service provider was established, taking the lead in establishing the direct connection with international hotel groups and launching the certificate scanning system to realize the rapid identification and registration of residents. Subsequently, the CRS model was further built to promote the progress of booking technology for high-end hotel groups. In 2011, the revenue management software began to be promoted in the hotel industry. Dianping was launched in 2003, focusing on customer communication and gathering consumer experience, which changed the environment of hotel customer experience comments. In 2006, Hornet's Nest was established, which shifted the hotel's user experience sharing to the content level, and officially opened the UGC era. In 2009, Hangzhou Huanglong Hotel was upgraded to be the world's first smart hotel. In 2012, Beijing Kerry Hotel took the lead in introducing paperless office solutions, opening the digital era of guest experience. In 2013, the hotel entered the era of Internet + new media marketing, opened the application of the WeChat public account, and actively developed its own app to enter the mobile Internet market. In the same year, 7 Days Hotel took the lead in supporting WeChat payment, and Beijing International Hotel took the lead in introducing a cloud breakfast service. In 2014, the hotel's 4G network was basically covered, and it took the mobile channel as the main battlefield of OTA competition and opened the O2O mode. Some hotels support mobile terminal self-service room selection and self-service check-in, introduce an intelligent customer control system, or even have a mobile phone door card mode, where guests can use WeChat to directly open the room door lock.

Hotel information technology began to focus on customer service and improve efficiency and entered a critical period of technology development from 2015 to 2017. At this stage, the hotel has basically completed the information construction, but the data efficiency has not been stimulated. In 2015, related enterprises will further optimize the hotel operation's business technology and promote the digital development of the hotel. For example, OTA invested hotel PMS system deeply excavates the data before and during hotel stay; Alipay began to be widely used in the industry. Subsequently, the hotel industry widely used the code scanning order service, as Flying Pig announced creating a "smart hotel." In 2015, the e-commerce industry was booming, from transaction e-commerce and content e-commerce iteration to short video e-commerce, which promoted drastic changes in the hotel operating environment. Flying Pig launched "credit live" digital hotel products to innovate the hotel experience; hotel mobile PMS began to sprout and explore the community marketing model based on big data. In 2016, under the promotion of cloud computing, the hotel entered the cloud transformation stage and began to use the geography evaluation management system to optimize online management and customer experience. In 2017, the first unmanned intelligent hotel was opened in China, which gradually promoted the application of self-service

machines and AI intelligent voice devices. Then, the hotel began to introduce the WeChat small program, build a private domain system, and develop the private domain traffic.

3.1.3. Data Platforming stage

From 2018 to 2020, the digitalization of hotel marketing will further develop, greatly enriching the online products and making the online penetration rate reach 70%–80%. The application of hotel digital technology has entered the outbreak period. All hotels vigorously develop self-service machines, the Internet of Things, robots, face recognition, blockchain, and other technologies, and the pace of development of digital operations is accelerating. The concept of “decentralization” has been continuously deepened in the hotel operation. The first hotel in China to support virtual currency payment has opened, realizing the development and application of intelligent service, full-scene identity recognition, and face recognition technology. In 2018, the central settlement platform was launched, and China Travel Service Group began to explore and build a data platform. The good development prospects of the hotel industry have also attracted many giants to explore the hotel market. AutoNavi map began to adjust its internal structure and focus on the layout of the wine travel industry. Pinduoduo began to sell hotel accommodation products and develop the online tourism business; iQiyi entered the hotel industry to create VR entertainment hotel space. In 2019, China Mobile and Ctrip signed a strategic cooperation to create a 5G ecosystem, marking the entry of the 5G era. The concept of HOS in the hotel is further deepened, and the robot automation is widely concerned. Hotel PMS under the promotion of capital, the market gradually formed four giant patterns, namely, Ali Shiji, Meituan Hong, China Soft International, and Hangzhou Green Cloud. In 2018, the hotel began to lay out new retail scenarios to create differentiated competitive advantages. In terms of new hotel openings, Alibaba built the first future hotel in China. Baidu released Duer OS smart hotel solutions and landed in Shenkeng Hotel. In 2020, with content e-commerce entering a period of vigorous development, the rise of hotel live streaming with goods, and further pay more attention to and optimize the channel combination management. Enterprises in other fields greatly entered the hotel field, Xiaohongshu reached cooperation with orders to achieve direct connection of home stay; Amap online “secure accommodation hotel”, support online booking; Tiktok layout of the wine travel market, to create its own platform trading closed-loop ecology. Traditional hotels have begun to embrace “contact-free services” and have successively opened up digital RMB payment channels.

3.1.4. Development stage of digital intelligence

After 2021, under the influence of the pandemic, the hotel will enter an accelerated period of digital operation and development and start to develop into data and platform. The hotel uses big data algorithms, the Internet of Things, 5G, and artificial intelligence to analyze customer data deeply and start the development of digital intelligence. Digital intelligence is a product of the DT (Data Technology) era, which refers to relying on cloud computing, the Internet of Things, big data, and AI technologies to realize intelligent perception and decision-making, enrich executive functions, improve adaptive learning ability, and enhance data efficiency. The hotel industry has carried out a large number of business cooperations with the app and introduced and upgraded the data platform. In 2021, the hotel industry generally supports the direct booking business in the app^[9]. The new hotel booking business is directly connected to Ctrip and the Cheng Yilong platform. The hotel introduces a large number of data platforms to provide support for the digital closed-loop management of the hotel. The internal self-service machine of the hotel is directly connected with the public security system, and the customer’s identity information can be directly verified online. China Jinjiang Group, Huazhu and Beijing Capital Travel Home Hotel and other head hotels

and star hotels continue to improve the digital level, to create intelligent rooms and digital intelligence operation system. Jinjiang Group started the pilot of “digital hotel”, focusing on seven scenarios of online booking, online room selection, one entry, intelligent customer control, intelligent customer control, room information service, quick departure, regional room cleaning and sharing, accelerating the application of Internet, 5G, AI, and other digital technology sharing, to create a more convenient customer experience. Huazhu Group makes use of digitalization to build core competitiveness, create “Hua shopkeeper” self-service all-in-one machine and “easy series” digital products, and improve the operation efficiency. It has realized digital services such as “30 seconds check in, 1 second check out”, intelligent voice customer room control, and intelligent delivery robot mission, which not only improves the efficiency of hotel service operation but also provides convenience and a sense of technology for guests to enter. This paper summarizes the four aspects of development strategy, development characteristics, technical support, and business innovation, and divides the transformation process of hotel digital operation into six stages and levels of L1–L6 (**Figure 1**). This paper summarizes the development process of hotel digital operations in China from the perspective of key actions (**Table 2**).

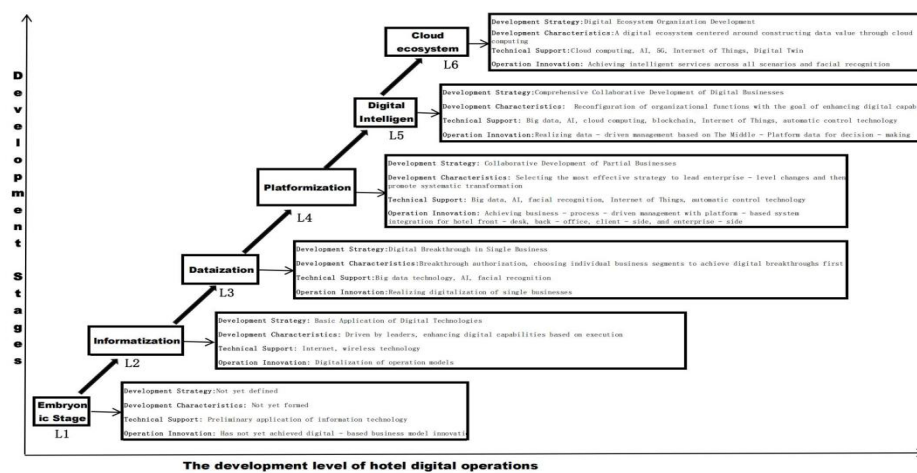


Figure 1. The evolution process and development level of hotel digital operation in China

3.2. Digital operation status of the hotel industry

3.2.1. Application of core technologies

At the present stage, the core technologies involved in the development process of hotel digital operation mainly include four technologies: intelligent room, artificial intelligence, AR / VR, and mobile technology (**Figure 2**). Among them, the smart room allows customers to voice control indoor media, curtains, air conditioning, lighting, and other hardware facilities or call services through the hotel app, Amazon Alexa, Google Assistant, and other software. Artificial intelligence is mainly used in hotel chatbots to collect customer data, provide personalized check-in experiences, and simplify the hotel service process. AR/VR can provide customers with virtual rooms and all hotel infrastructure so that users can experience the hotel environment in advance through smartphones and VR headsets. Mobile technology is the backbone of the continuous development of hotel digital operations, which can effectively strengthen the connection between customers and the hotel and provide customers with real-time information such as advanced booking, flight schedule query, and hotel map.

Table 2. Development process of digital hotel operation in China based on the perspective of key actions

Stage of development	Technical aspects	Corporate aspects	Keyword
Initial bud stage (Before 1998)	In 1979, the first hotel management software with a query function was developed in China	In 1987, the Nianhua company was established	Electronize Informatization
Initial application of information technology	In 1990, CSHIS was developed in China	In 1990, Beijing Zhongsoft Haotai Hotel Computer System Engineering Company was established	
	1993 Qianli horse hotel management system DOS version was launched	In 1992, Guangdong Labor Computer System Development company was established	
	In 1998, the hotel management system WINDOWS version was launched	In June 1993, Hangzhou Xihu Software Co., Ltd. was established	
		In 1998, Beijing Zhongshi Foundation Network System Engineering Technology Co., Ltd. was established	
Informatization development stage (1999-2017)	In 1999, domestic OTA platforms were established successively, promoting online hotel booking. In 2007, a direct connection channel between hotel groups and OTA was established	Dianping was established in 2003 to change the market environment of hotel marketing	Online wireless technology Big data Mobile
	In 2007, the certificate scanning system was developed to realize the rapid identification and registration of guests. In 2008, domestic enterprises built the CRS mode and innovated the reservation technology of high-end hotel group	In 2006, Homet's Nest was established, officially opening the UGC era	
	2011 revenue management software in the hotel industry landing and promotion	In 2007, China's first direct technical service provider was established	
	In 2011, wireless technology application, mobile terminal application was launched in the hotel industry	In 2009, Huanglong Hotel was upgraded to the world's first smart hotel	
	In 2012, the new media became a new marketing platform for the hotel	In 2011, high-star hotels joined the newly emerging army of group buying	
	In 2013, the hotel industry began to use the WeChat public account and cloud breakfast service	In 2012, Beijing Kerry Hotel took the lead in the paperless office, opening the era of digital experience for guests	
	In 2015, the hotel opened the one-key billing mode; Alipay is widely used	In 2013, many hotels opened the Internet + new media marketing mode and supported WeChat payment	
	In 2015, the hotel mobile PMS began to sprout, and the industry data awareness rose	In 2014, hotels basically used the 4G network and 020 mode, taking mobile channels as the main battlefield of OTA competition. In 2015, some hotels supported mobile terminals to select rooms and check in independently or introduced an intelligent customer control system. In 2015, the OTA platform invested in PMS to mine the data before and in hotels	
	In 2016, the hotel entered the stage of cloud transformation and began to use the geography evaluation management system to build the scanning code ordering service and artificial intelligence hotel	In 2017, China's first unmanned reception smart hotel opened	
	In 2017, the self-service machine began to promote the application; open the WeChat small program application to build the private domain system	In 2017, Flying Pig announced the construction of Hangzhou Xixi Paradise as an "artificial intelligence hotel"	
Data platform development stage (2018-2020)	In 2018, it was further "decentralized" and began to support virtual currency payments	In 2018, the internal structure of Amap was adjusted, focusing on the layout of the wine tourism industry	Self-service machine Blockchain Internet of Things Robot Face recognition
	In 2018, intelligent service & full-scene identity recognition and face recognition technology began to develop	In 2018, Alibaba will build the first future hotel in China	
	In 2019, the 5G ecology was created, and the hotel management system PMS formed four major system patterns	2018 Baidu Duer OS Smart Hotel solution landed in deep pit Hotel	
	Robotic automation has attracted wide attention in 2019	In 2018, the hotel began to lay out new retail scenes and highlighted its differentiated competitive advantages	
	In 2019, the central settlement platform began to launch	In 2019, China Mobile signed a strategic cooperation with Ctrip to create a 5G ecosystem	
Hotel technology application has entered the outbreak period	VR technology was popularized in 2019	In 2019, Pinduoduo launched its hotel accommodation products and entered into online travel	
	In 2020, the hotel will rise live with goods, optimize the channel combination, and develop "contact service."	In 2019, iQiyi began to build a VR entertainment hotel space	
	In 2020, the hotel's digital RMB payment channels will be opened	In 2020, TikTok will lay out the wine tourism market and create a closed-loop trading ecology of its own platform	
Digital intelligence development stage (after 2021)	Develop the app cooperation business in 2021 and later and reference and upgrade the data platform	In 2021, Ctrip's "Planet" was officially opened, integrating brand products, content, and activities	Artificial intelligence Internet of Things 5G Big data Cloud computing
The hotel industry digital intellectual development era	In 2021, the hotel self-service machine and the public security system will complete the direct guest identity verification of the online Internet of Things application scope extension	In 2021, TikTok will realize the hotel booking function in the app	
	Digital twin enables data visualization scene construction	In 2021, HangTravel will add a hotel booking business, directly connecting Ctrip and Tongcheng Yilong platform	
	The value advantage of data is further highlighted		

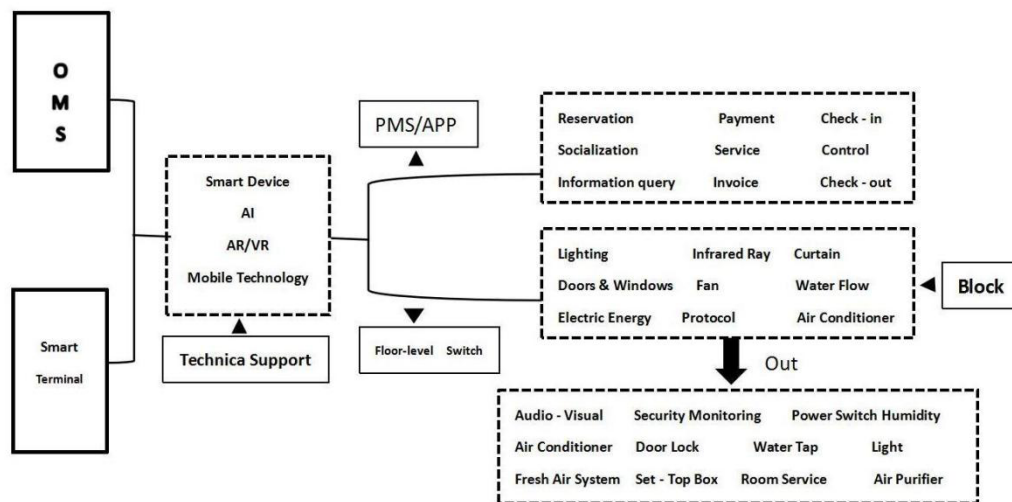


Figure 2. Technical function module in the digital operation of the hotel

The application of the core technology in the digital operation of hotels mainly shows the following characteristics. First, it enriches the digital product supply under the hotel's digital operation strategy. Under the impact of the pandemic, hotel operations rely more on digital products and use digital technologies such as 5G and AI to accelerate the development of new products. In this case, the hotel gradually realizes online room selection, intelligent customer control, one key, micro service, quick departure, and other services to improve the operation efficiency. The usage increased by 52.38% in 2020 from 2019 and 21.76% in 2021 from 2020, reaching a new high in 2021. Second, promote the hotel booking channels gradually turn to online. The main hotel channels for consumers are OTA, accounting for about 29.27%, followed by hotel WeChat mini program and public account, accounting for about 27.64%, and again for the traditional hotel reservation number and direct check-in. Third, to assist the hotel to develop private domain traffic. With the upgrading of the Internet, digital technology, app research and development technology, most hotels began to actively establish new traffic platforms, such as payment, social networking, content planting grass, short video and other platforms, and obtain good user conversion effect. Among the many new platforms, the hotel's WeChat official account is still the platform with the most attention from the hotel's We Media, followed by the hotel's TikTok, Xiaohongshu, Kuaishou, and other platforms.

In the era of 5G, digital hotels shifted operations into the fast lane, as powerful technical infrastructure can provide an excellent hotel experience. Guest experience and hotel operations and big data, artificial intelligence, Internet of things, control technology, cloud computing technology, the depth of the fusion application, and cloud ecological development will be the future of hotels to break the barriers of physical space and solid hardware, building up the new pattern of intellectual development.

By sorting out the landmark events in the development process of hotel digital operation in the 1G to 5G era since the 1980s, this paper summarizes the application of various key technologies in different development stages of hotel digital operation in **Table 3**.

Table 3. Development dynamics and key technology application of hotel digital operation development in the 1G–5G era

Time interval	Development dynamics	Key technology applications	Trend
1G era 1980s–1994	In 1990, the hotel POS system integration and central management information system appeared, and the system CSHIS was born In 1993 Qianli horse hotel management system DOS version was launched In 1994, the first online hotel directory was Travel web.com, the first hotel website in the same year (Hyatt and Promus Hotel Corporation)	Electronic communication technology Computer information technology	Electronize Informatization
2G era In 1995–2008	In 1995, Choice and Holiday Inn pioneered the online booking system to provide real-time central booking for guests In 1996, Expedia was founded, the Travelocity website was launched, and the era of online hotel booking was opened In 1999, domestic OTA platforms were established successively to promote online hotel booking In 2000, Marriott took the lead in building a revenue management system based on 12 EE applications In 2002, China's first online order engine officially appeared (Derby Software) Founded in 2003, Dianping is dedicated to the communication and aggregation of urban consumption experience In 2006, the Homet's Nest was founded, and the hotel UGC era was opened In 2007, Shiji Chang Lian, the first direct connection technology provider in China, was established to build a direct connection channel with international hotel groups 2007 Develop the certificate scanning system to realize the rapid identification and registration of residents In 2008, domestic enterprises built the CRS model and innovated the high-end hotel group booking technology	Information technology Internet technology	Online informatization
3G era In 2009–2013	In 2009, Choice Hotels pioneered the hotel mobile app along with Intelity In 2009, Hangzhou Huanglong Hotel was upgraded to build the world's first smart hotel Digital concierge systems emerged in 2010 World's first built-in iPad in 2010 (New York Plaza Hotel) In 2011, Meituan, Nuomi, and other group buying models rose, Gaoxing Hotel joined the group buying army, and mobile terminal applications opened In 2012, Kerry Hotel Beijing took the lead in introducing paperless office solutions, opening the digital era of guest experience In 2013, Beijing International Hotel took the lead in launching the cloud breakfast service In 2013, the hotel began to develop its own app and enter the mobile Internet market In 2013, the first hotel in China to support WeChat payment was launched (7-day hotel)	Wireless technology Mobile Internet technology	Mobile paperless
4G era In 2014–2019	In 2014, the room entry is keyless, the mobile phone is the door card mode, and the room door lock can be directly opened In 2014, 4G network basically covered and entered the hotel industry, and mobile channel became the main battlefield of OTA In 2014, the Meituan app rose to prominence, focusing on the middle and low-end hotels In 2014, the O2O mode was first used in the industry, and the mobile terminal self-service room selection and self-service check-in and check-out rooms were promoted in the hotel industry In 2014, the intelligent passenger control system began to be widely used in the hotel industry The world's first robot hotel opened in late 2015 in Japan (Henn-na Hotel) In 2015, based on the development of the WeChat platform, the hotel mobile PMS began to appear, the first one-click billing mode in China In 2015, the first intelligent robot was put into use in Hangzhou New Century Mingdu Hotel In 2016, the hotel industry evaluation management system began to be online to optimize online management and guest experience In 2018, the first unmanned reception smart hotel was opened in China, and the self-service machines began to gradually promote and apply In 2018, the application of face recognition technology was launched, marking the first future hotel in China to achieve intelligent service and full-scene identification	Big data Self-service machine Internet of Things robot Face recognition	Platform datamation
5G era From June 6, 2019, till now	In 2018, the world's first virtual currency payment hotel appeared—the Etherian Hotel in Aba Tibetan and Qiang Autonomous Prefecture 2018 Baidu Duer OS Smart Hotel solution landed in a deep pit hotel In 2018, the internal structure of Amap was adjusted, focusing on the layout of the wine tourism industry In 2019, China Mobile and Ctrip signed a strategic cooperation to create a 5G ecology, and China's liquor and tourism industry entered the 5G era In 2019, iQiyi entered the hotel industry to create a VR entertainment hotel space In 2019, Pinduoduo launched its hotel accommodation products and entered into online travel In 2020, Xiaohongshu and orders have reached a cooperation to realize the direct connection of B & B In 2020, TikTok will lay out the wine tourism market and create a closed-loop trading ecology of its own platform In 2020, Amap will launch the "peace of mind hotel" to support online booking In 2020, the hotel industry will begin to fully apply the "contactless service" In 2021, the Nianhua Hotel will become the first batch to realize digital RMB payment application scenarios In 2021, TikTok will realize the hotel booking function in the APP In 2021, HangTravel will add a hotel booking business, directly connecting Ctrip and Tongcheng Yilong platform	Cloud computing Digital twin AI Blockchain	Number of wisdom Cloud ecology

3.2.2. Enterprise development trends

In the development process of digital operation of hotels in China's country, the top C4 enterprises in China's hotel industry, such as Jinjiang Group, Huazhu Group, New Century Hotel, Capital Tourism Jianguo Hotel Group, as well as digital technology enterprises such as Shiji Information, Hangzhou Green Cloud, and Blue Bean Cloud, have been cultivating new fields of digital operation for a long time. In the process of digital operation and development of the hotel, the above head enterprises obviously have the following characteristics. First, the digital operation of the hotel has a clear development goal; maintaining market competitiveness and improving the operating revenue are the core driving forces of the transformation. The primary goal of more than 60% of high-star hotels is to strengthen existing customer relationships and increase user retention rates, while the secondary goal is to increase bookings, provide customers with high-quality experiences, and ensure that the hotel business can be flexibly switched between online and offline. Second, the scale of hotel digital operations has increased significantly. Since 2015, the digital channels and products of high-star hotels have begun to develop, promoting the digital operation development of hotels into rapid growth. Despite the impact of the epidemic in the following years, the digital operation development of high-star hotels saw a significant increase of more than 100%. In 2020, the digital operation scale of the hotel increased by 37.78% compared with 2019 and increased by 16.33% in 2021.

The digital operation of China's hotel industry utilizes hardware intelligence, service digitalization, business process digitalization, and group chain management digitalization. Specifically, the hotel business system (such as PMS, POS) showed the highest technology maturity, with 51.5% of the enterprise respondents believing that it is in the industry leading level in the construction of related systems. About 40% of the enterprise respondents believe that they are the industry leader in the application of customer technology or data analysis technology. In terms of efficiency improvement technology and digital marketing technology, both account for about 36%, and the maturity of the industry application still needs to be improved, which means that China's hotel industry has a broad development prospect in the application of such technology in the future. The intelligent transformation of hardware promotes the realization of service digitalization and then realizes the digitalization of the hotel business process and group chain management.

At present, the development of digital operations in China's hotel industry is still facing some practical difficulties. First, financial difficulties. Compared with the operating cost structure of the hotel, the structure has changed greatly 20 years ago: the costs of property, labor, depreciation, and maintenance are all increasing, but the hotel price income has not increased significantly, leading to the low profit level of the whole industry. Relevant statistics show that in the 10 years from 2010 to 2020, the average rental rate of four-star and five-star hotels in China showed a downward trend, and the overall profit of high-star hotels gradually decreased. In the unprofitable business environment, it is difficult for the hotel to invest in the digital construction, and the development of the digital operation of Gaoxing Hotel is facing difficulties. Small and medium-sized hotels adopt the leasing mode, which needs to spend a large amount of housing rental costs, coupled with the impact of the epidemic and also lack of funds to invest in digital construction. Second, IT talents lack management and decision-making power. The development and promotion of the digital operation of the hotel is a major project. Due to the management characteristics of the hotel industry, the IT technical personnel in the strategy formulation and leadership in the development of the digital operation are not large, and most of the decision-making power is in the hands of the CEO, vice president, director, and other positions. In the digital context, IT departments need to have a comprehensive understanding of the company's future development direction, optimize data assets, help enterprises create value, and gain insight into growth opportunities and possible risks rather than just maintaining

internal information management within the hotel. Third, the Matthew effect of the industry highlights that the gap between the digital construction level of various enterprises in the hotel industry is gradually widening, among which the industry-leading hotels have a stronger willingness to invest, and the investment effect is more obvious. At the same time, the development of digital operations in the hotel industry will be affected by the macroeconomic environment and technology investment, but the digital ability among enterprises is uneven, which easily produces fierce industry competition, so that the development of leading enterprises have more advantage.

3.3. Future trend of digitalization of the hotel industry

The development of digital operations in China's hotel industry is promoting the development of income, experience, and efficiency and is entering a new stage of coordinated development. With the gradual deepening of the online business degree, the digital operation transformation of the hotel industry is gradually tending to the pragmatic goal of long-term value mining and release. According to the "2022 China Hotel Industry Digital Transformation Trend Report", "Ten Digital Development Trends of China's Hotel Industry" and relevant research can be predicted^[10-11]. In 2026 and beyond, the value advantage of data assets in the hotel industry will be further highlighted. The hotel expanded the application scope of the Internet of Things and began to build a digital twin, enabling the data visualization scene.

The trend of digital operation in China's hotels is shown in the following three aspects: First, the digital operation technology of the hotel industry is constantly upgraded. The technical architecture of the hotel industry changes from closed integration to micro-service, the dependence between modules is weakened, and the operation speed, efficiency, and expansibility of the system are significantly improved. In the future, the hotel industry will pay more attention to new technology security, data security, cloud security, and customer information privacy, and improve the development level of the background system cloud. At the same time, the trend of unmanned retail in hotels is deepening, and the use of unmanned retail machines and self-service sales robots is becoming more normal. Second, the hotel's C-end precision marketing is constantly strengthened. The CRM system of the hotel industry is facing further upgrades. In the future, the upgraded CRM system will be based on cloud native, with a micro-service framework, with stronger scalability. The customer portrait dimension has been significantly upgraded in quantity, which can support more new marketing methods and also contribute to the coordination and linkage at the group chain level. Under the dividend of content e-commerce and short video e-commerce, hotels can participate in tourism live broadcasts through the anchor and social media KOL mode to promote the growth of direct sales. The hotel industry will further release the value of private traffic, optimize the data analysis system, and build a private traffic pool and trading platform based on WeChat ecology has become the hotel set. In addition, the hotel industry will focus on the development of the membership system, facing the local market to grasp the new flow entrance and develop the hotel O2O market. Third, artificial intelligence (AI) will be deeply integrated with the hotel operation scene. AI platform can automatically set the guests personalized label, to realize personalized service and marketing, the hotel industry intelligent data can also put the complex data visualization, through AI platform predicted accurate occupancy or consumer demand, and as business decision basis, to the market, energy consumption, channels, labor costs to make accurate judgment in advance, to save costs, improve efficiency, maximize the goal of customer value, and similar AI decision platform will become the future digital hotel operation control center.

4. Research dynamics of digital operation in China

4.1. Literature overview

4.1.1. Methods of literature search and measurement analysis

In this paper, bibliometric analysis, literature reading, and key event analysis are used to comb through and summarize the existing literature. In June 2023, the study searched for CNKI “theme”, including “digital operation of hotels”, “digital operation”, “digital transformation”, “Hotel digital operation”, and “Digital operation”. “Research Article”, “CSSCI”, and “Peking University Core” are selected, and the literature publication year is not limited. According to the above search conditions, a total of 1224 documents can be obtained, which are all literature analysis samples of this study.

4.1.2. Time distribution and complete examination of the literature

Literature samples were tested using the price curve function to ensure that the recall of the study data reached the standard. The initial publication year of the literature sample was 1990, and the research method of Su Yi et al. is referred [12–32]. Based on the amount of literature from 1990 to June 2023, it can be calculated that the price curve function of the hotel digital operation is $F(t) = 1 \times e^{0.2124t}$ ($T = \text{year of literature publication} - 1990$). The annual accumulation of literature samples and the price curve show that the published literature accumulation and price curve in the related fields of hotel digital operation have a relatively high degree of fit, indicating that the selection strategy of literature samples is scientific and can ensure that the recall rate of research data reaches the standard. In addition, according to the prediction function of the price curve function, **Figure 3** shows that the amount of literature published related to the digital operation of hotels is far from saturation, and there is still a large space for development.

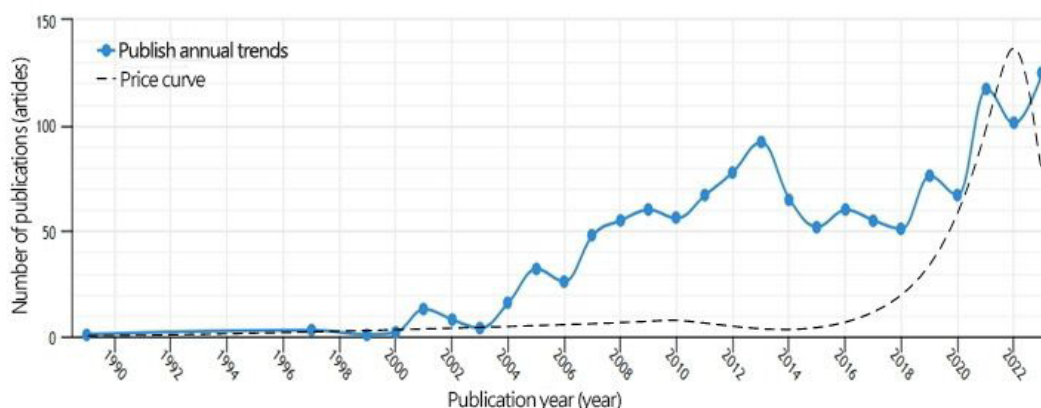


Figure 3. Annual cumulative number of literature published from 1990 to June 2023 and its Pleß curve

4.1.3. Literature research topics and subject distribution

This paper adopts the CNKI visual analysis function. The subject of literature samples, discipline, and research institutions distribution information were analyzed, including the first five of the literature for digital transformation (198), digital operation (39), digital (32), digital operation (25), budget hotel (19), the first five for the hotel industry (97), hotel group (75), business model (69), digital economy (54), and financial technology (41). The subject distribution of hotel digital operation-related literature is mainly information economy and postal economy, enterprise economy, finance, industrial economy, computer software and computer application, and

trade economy. On the whole, the related research on the transformation of hotel digital operation involves several themes and disciplines and has the characteristics of spanning economics and technology.

4.2. Research progress

4.2.1. Research process and current status quo

The quantitative dynamics of the research literature were analyzed with the help of price curves. According to the annual accumulation amount of literature published from June 1990 to 2023, its price curve and the topics, disciplines, and research institutions published are shown in **Figure 4**.

First, the industry dynamic research trend analysis. From 1990 to June 2023 in the process of time series change, according to the “hotel digital operation”, “digital operation” and other keywords to retrieve the number of literature, and build the press change curve, can be seen that in digital “hotel” or “digital” in the field of research, literature growth quantity lags behind the industry practice dynamic progress.

Second, the industry dynamic activity analysis. According to the price curve of the time series from June 1990 to 2023, shown in **Figure 4**, the activity of “hotel digital operation” in China is mainly divided into three stages: (1) low activity period, from 1990 to 2000. Chinese scholars’ related research activity of “hotel digital operation” is very low, which basically shows a trend of single-digit published literature every year. The academic community has not yet formed a unified understanding of informatization and digital operation. (2) The rising period, from 2001 to 2016. Chinese scholars have begun to pay attention to the relevant research on the “digital operation of hotels” and show a gradual upward trend, but the overall activity of the research is not high, and the literature published every year is still less than 50 articles. At this stage, China’s hotel industry is in the stage of rapid development of information technology. Chinese scholars have begun to put forward the relevant concepts of the digital operation of hotels and have formed certain research results. 3) High activity period, after 2017. Chinese scholars are very active in their research on “hotel digital operation”, and the number of published literature every year has an obvious growth trend.

Third, according to the distribution of the literature, the main topics of research are still focused on digital transformation, most of which are related to economy, finance, and technology, and the research institutions are mainly concentrated in a few institutions. Therefore, on the whole, although the research on “hotel digital operation” in Chinese academia started late, and the disciplines and research institutions involved are relatively single, the situation of “comprehensive flowering and comprehensive follow up” has not been formed in the academic circle.

4.2.2. Association between research and practice

According to the above literature research and analysis, it can be seen that there is still a certain disconnection between theoretical research and industry practice in China, which is mainly manifested in the following aspects:

First, the research content is out of touch with the actual needs. Its performance is the inconsistency between the research hotspot and the actual demand. In the growth curve of price literature, the research hotspot is often reflected in the rapid growth of the number of literature, but it is not synchronized with the actual demand in the same period. For example, in the development of hotel digital operation, researchers may focus on the application and innovation of emerging technologies, but actual needs may focus more on solving practical problems, such as management and organizational change, data privacy and security, etc.

Second, the theoretical development is not consistent with the practical application. Theoretical research often

needs time for in-depth exploration and verification, while practical application may be realized after theoretical research. In the development process of hotel digital operation, theoretical research may put forward some innovative concepts and frameworks, but these theoretical results need further empirical research and practical verification to be widely applied and promoted.

4.3. Research review and enlightenment

4.3.1. Review of foreign studies

The existing foreign-related research is mainly divided into two parts, which are the characteristics of hotel digital operation and the motivation of hotel digital operation. At present, a preliminary analysis framework has been established in the relevant research on the digital operation of hotels, but most of the studies focus on the description of hotel cases, and there are few summaries of the internal laws of the hotel's digital operation. Foreign research is turning to the macro analysis of the digital operation from the perspective of the hotel market, and the research on the digital operation of hotels has changed from "what" to the substantive analysis of "why." What strategies to guide the hotel to promote the development of digital operation, especially how to timely integrate new technologies, enrich the hotel business, attract customers to repurchase and other issues need to be discussed in depth. As the academic community has not unified the evaluation method for the development of the digital operation of hotels, there is a lack of objective and direct quantitative statistical evaluation, so it is difficult to measure and compare the development level of the digital operation of hotels. Therefore, some researchers are developing a comprehensive and higher evaluation index system for the evaluation of the hotel's digital operation practice effect, especially in addition to the hotel's factors, trying to include the external indirect factors such as the surrounding environment, market economy, and the evaluation of community residents.

4.3.2. Implications for China

At present, there are relatively few studies on the digital operation of hotels in China. The existing research literature is mostly from the perspective of talent training and school education and has little discussion on the internal operation and overall development of the hotel. Although most of the research involves digital operation, it is limited to the understanding of ideas. The main research idea is basically to transplant foreign research results, and the originality is weak. Foreign theories are not fully applicable to the Chinese hotel market environment because it is different from the foreign market economic environment and policy environment of the hotel industry. The development of the digital operation of hotels in China is the result of the joint promotion and guidance of the government and the market. Although China has introduced various preferential tax policies to support the digital development of hotels, it also leads to the excessive dependence of the hotel industry on the government in the process of its digital operation and development. This distorted market is not conducive to the formation of independent business exploration of hotels. Existing research shows that the digital operation of hotels in China has its own characteristic operation logic, follows the principle of being people-oriented and customer-centered, and pays more attention to giving digital technology a human touch and temperature.

Therefore, the research of hotel digital operation in China needs to clarify the research direction and research paradigm. In the future, the research on the digital operation of Chinese hotels can be further deepened from the following aspects. First, analyze the real cases of digital operation of domestic hotels. According to the actual development of hotels in China, the study will investigate why to promote the digital operation of hotels, and then explore the development strategy in depth, to provide Chinese experience evidence for reflecting the

value orientation of hotel digital operation research. Second, analyze the localization process of international hotel digital operations. Existing research shows that according to the development law of the local market, the reasonable adjustment of the hotel digital operation landing plan is the key to the successful implementation of the hotel digital operation. Given the particularity of the Chinese economy, future research must investigate the digital operation measures of international hotels after entering China and analyze their localization measures and advantages.

5. Study conclusions and recommendations

First of all, the core path of the development of the hotel's digital operation is to realize the reconstruction of the hotel value system. Therefore, every digital operation activity of the hotel should be carried out on value creation as the main line. The digital operation of the hotel fundamentally promotes the optimization, innovation, and reconstruction of its value system and constantly creates new value and momentum. If the value system of the hotel has not been optimized, innovated, and reconstructed, and the new service power has not been improved, then the development of the so-called digital operation is only superficial, with no value at all. At present, the rapid development of digital productivity has not only triggered the transformation of the traditional industry mode of production but also profoundly changed the business system and value model of the hotel industry. The hotel value system in the era of the digital economy is an open value ecology formed based on the joint construction, co-creation, and sharing of new service forces. Based on the application of digital technology, the hotel transforms and improves the operation process of the hotel industry, which is different from the traditional business model, to realize cost reduction and efficiency increase and create value and benefits through high-quality development. The system architecture and method mechanism of hotel digital operation should always be oriented by value creation and clarify the objectives and tasks of digital operation value creation through periodicity to improve the ability of value creation, value transmission, and value acquisition.

Secondly, the hotel's senior management should take the lead to promote, do a good job in top-level design, and deepen the degree of employees' participation in digital operation. The core goal of promoting the digital operation of hotels is to enhance the customer check-in experience. As a group with direct contact with customers, employees should be full of work enthusiasm and highly involved in digital operation work to achieve sustainable digital development more efficiently. On the one hand, the management should actively accept the new tools derived from the digital technology according to the market changes and then lead the employees to accept and apply the new system as soon as possible. On the other hand, the hotel can introduce an incentive mechanism to encourage employees to make suggestions and suggestions, bundle the rights and interests of employees with the interests of the hotel's digital operation, improve the staff's sense of identity to the digital operation strategy, and accelerate the development of the hotel's digital operation.

Finally, the hotel needs to clarify its own needs and optimize the development path of digital operations. With the wide application of digital technology, all walks of life began to actively change their working mode and vigorously develop the intelligent office mode. On the one hand, hotel managers can make a clear digital operation development plan according to the actual digital operation level and form the corresponding digital operation charter to ensure the orderly implementation of all digital management work. On the other hand, hotels can actively establish cooperation with other industries or hotels, learn and introduce advanced digital operation experience, and timely adjust the digital operation strategy according to the changes in market demand to improve

the market competitiveness and realize the steady transformation of digital operation.

Disclosure statement

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References

- [1] Viola A, 2019, Series and Other Unit-Based Alternatives: Notes on Contemporary Digital Operations. *Architectural Design*, 89(2): 110–117.
- [2] Xu H, 2017, Discussion on the Cost Control of Tourism Advanced Hotels from the Perspective of Value Chain. *Accounting communication*, 38(8): 87–89.
- [3] Xiong W, Wu YH, 2018, Study on the Influence of Wisdom on the Performance of High-star Hotels in the Pearl River Delta Region. *Journal of Tourism*, 33(11): 75–86.
- [4] Qu XM, Li X, 2019, Analysis on Hotel Talent Training Strategies of Application-oriented Undergraduate Universities from the Perspective of Global Tourism. *Vocational and Technical Education*, 40(11): 37–39.
- [5] Tao SY Zhang XJ, Fu XY, et al., 2022, Research on the Digital Online Room Selection Scheme in the Hotel Front Hall. *Economics*, 5(3): 76–78.
- [6] Liu XC, Fu LY, 2021, Analysis of the Market Equilibrium and Effect under the Hotel OTA Operation Mode. *Industrial Economic Review*, 9(3): 77–87.
- [7] Zhang ZP, 2022, Digital Operation Mechanism of the Supply of Public Cultural Products and Services. *Shandong Social Science*, 36(2): 84–92.
- [8] Ezendu A, Sarah O, Isaac WK, 2014, Green Information Technology Audit and Digitalization in Small Medium Enterprise (SME): Factors That Influence Intentions to Use Hotel Websites. *International Journal of Information Communication Technologies and Human Development (IJICTHD)*, 6(4): 14–20.
- [9] Hyeongmin K, Chang H, Chanh S, et al., 2021, How can Hotel Smartphone Apps Enhance Hotel Guest Experiences? An Integrated Model of Experiential Value. *Journal of Hospitality and Tourism Technology*, 12(4): 791–815.
- [10] Shi D, Yu MC, Li MQ, 2021, Personalized Hotel Recommendation Algorithm Based on User Privacy Data. *Journal of Shandong University (Science edition)*, 56(7): 1–10.
- [11] Line ND, Dogru T, El-Manstrly D, et al., 2019, Control, Use and Ownership of Big Data: A Reciprocal View of Customer Big Data Value in the Hospitality and Tourism Industry. *Tourism Management*, 80(4): 104–106.
- [12] Su Y, Guo JX, Wang WJ, 2019, Research Hotspot and Frontier Analysis of Domestic Regional Innovation based on Scientometrics. *Scientific Management Research*, 37(6): 77–83.
- [13] Mustafa T, 2017, Place and Importance of Human Resources Management in Hotel Operations. *Press Academia Procedia*, 3(1): 265–272.
- [14] Tang JX, Li CY, Sun Q, et al., 2022, Research on the Influencing Factors of Hotel Digital Transformation Based on Rooted Theory. *Human Geography*, 37(3): 151–162.
- [15] Lele Z, 2022, A New Way to Cultivate the Employment and Entrepreneurship Ability of Graduates of “Hotel Management and Digital Operation” Major in Higher Vocational Colleges. *International Journal of New Developments in Education*, 4(13): 307–310.
- [16] Luo JH, Wu YL, 2021, Digital Operation Level and Real Earnings Management. *Management Science*, 34(4): 3–18.

- [17] Li J, 2022, Analysis of Professional Psychological Adaptability of Students Majoring in Hotel Management and Digital Operation for Higher Vocational Education under Deep Learning. *Wireless Communications and Mobile Computing*, 22(1): 83–85.
- [18] Mary S, 2021, The Future of Digital Operations in Home Building. *Builder*, 44(2): 16–18.
- [19] Zhang WY, Liu HY, Xu XC, et al., 2021, Construction of Digital Operation and Maintenance System for New Energy Power Generation Enterprises. *E3S Web of Conferences*, 236(12): 2017–2018.
- [20] Richard D, Sotirios A, 2018, Behind the Scenes of the British Library Qatar National Library Partnership: Digital Operations and Workflow Management. *Alexandria: The Journal of National and International Library and Information Issues*, 28(2): 86–100.
- [21] Bernard JA, Lanning DD, 1992, Considerations in the Design and Implementation of Control Laws for the Digital Operation of Research Reactors. *Nuclear Science and Engineering*, 110(4): 425–444.
- [22] Mathias D, 2019, Open Education Platforms: Theoretical Ideas, Digital Operations and the Figure of the Open Learner. *European Educational Research Journal*, 18(4): 439–460.
- [23] Song YM, Qi SY, 2021, Research on the Digital Operation Management of Hotel Catering under the Background of Global Tourism—Review of Hotel Catering Management (Second Edition). *Journal of Food Safety and Quality Testing*, 12(23): 9312.
- [24] Dong J, Wang YJ, 2019, Multi-market Contact and Service Quality of Budget Chain Hotels in China. *Economic Management*, 41(11): 157–173.
- [25] Han SH, Lee J, Edvardsson B, et al., 2021, Mobile Technology Adoption among Hotels: Managerial Issues and Opportunities. *Tourism Management Perspectives*, 38(2): 35–37.
- [26] Zentner H, Gra CAD, Barki DSM, 2022, Digital Business Models in the Hospitality Sector: Comparing Hotel Bookings with Yacht Charter Bookings. *Sustainability*, 14(19): 12755.
- [27] Wang X, Zhu YG, Wu Z, 2020, Selection and Pricing of Hotel and OTA Cooperation Mode Considering Consumer Preferences under Dual Channels. *Journal of University of Science and Technology of China*, 50(7): 985–992.
- [28] Li SH, Wei M, 2020, The Impact of Hotel Service Scenarios on Customers' Citizen Behavior: A Chain Mediation Model. *Economic Management*, 42(11): 177–192.
- [29] Zhao JJ, Liu B, 2019, The Influence Mechanism of Customer Bullying on the Alienation of Hotel Front-line Staff—the Analysis of Self-loss Perspective. *Business Research*, 35(5): 1–9.
- [30] Soonsan NM, 2022, Examining Antecedents on Chinese Customer Loyalty in the Boutique Hotel Business. *Journal of Quality Assurance in Hospitality & Tourism*, 23(6): 1430–1450.
- [31] Di R, Cao J, Zhao YJ, 2019, Online Travel Operation Mode under the Background of Travel “New Retail”—Take Ctrip as an Example. *China Circulation Economy*, 33(7): 45–52.
- [32] Back KJ, Park JK, LaTour K, et al., 2022, The Loyalty Program for Our Self-Esteem: The Role of Collective Self-Esteem in Luxury Hotel Membership Programs. *Cornell Hospitality Quarterly*, 63(1): 19–32.

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