How hotels adjust technology-based strategy to respond to COVID-19 and gain competitive productivity (CP): strategic management process and dynamic capabilities

Chun Liu
Beijing International Studies University, Beijing, China and Research Center of Beijing Tourism Development, Beijing, China, and Jingjing Yang
Macao Institute for Tourism Studies, Macao SAR, China

Abstract

Purpose – The purpose of this study is to explore how hotels evolve their dynamic capabilities to adjust their technology-based strategy to improve performance and to gain competitive productivity (CP) during the COVID-19 pandemic and in the aftermath.

Design/methodology/approach – In-depth interviews with hoteliers were conducted to unveil their dynamic capabilities amid the pandemic as regard adjustments and performance of self-service technology (SST)-based strategies. Thematic analysis was used to analyze the data.

Findings – Data analysis revealed four types of dynamic capabilities (i.e. sensing, learning, integrating and coordinating capabilities). Equipped with these capabilities, hotels made minor adjustments to their SST strategies. In general, during an economic downturn, hotels refrained from introducing new SSTs. SSTs introduced before the pandemic were used more frequently and received enhanced customer feedback. The findings further revealed that the factors influencing hotels’ application of SSTs before and after the outbreak of COVID-19 remained similar.

Originality/value – This is the first research integrating CP, dynamic capabilities and strategic management process to explain how hotels adjust technological strategies to recover in a suddenly changed environment. Such a framework enables scholars and practitioners from content-oriented and process-oriented perspectives to make quick but sound strategic management decisions in adapting to turbulent environments. This timely study enriches the expertise of using technology as a recovery strategy and contributes to future research on the practical application of SSTs and crisis management.

Keywords Dynamic capabilities, Self-service technology, Competitive productivity (CP), COVID-19 pandemic, Hotels’ recovery strategy, Strategic management process

Paper type Research paper

The authors would like to acknowledge the financial support of Young Academic Talents Programme of Beijing International Studies University, Beijing, China – Self-service technology adoption: An integrated model of TOE and TTF.
1. Introduction
As of April 2021, the COVID-19 pandemic has amassed a total of 132,046,206 cases including 2,867,242 deaths in 223 countries, areas or territories worldwide (World Health Organization, 2021). To fight against the highly contagious nature of this pandemic, governments have implemented policies of lockdown and social distancing. As a “high-touch” industry that relies upon human mobility and close interaction, hospitality and tourism have undoubtedly been devastated by the COVID-19 pandemic (Baum et al., 2020; Zenker and Kock, 2020). The COVID-19 pandemic has caused the hospitality and tourism industry to hit the pause button (Liu and Hung, 2021). In the first quarter of 2020, the average occupancy rate of star-rated hotels in mainland China was reported as only 22.83% [Ministry of Culture and Tourism of the People’s Republic of China (MCTPRC), 2020a]. Fortunately, due to effective containment of the virus, hotels in China gradually reopened and began to make profits. An increasing number of hotels have shared the good news: the average occupancy rate grew to 33.08% in the second quarter and 49.02% in the third quarter of 2020 [Ministry of Culture and Tourism of the People’s Republic of China (MCTPRC), 2020a, 2020c].

During the implementation of epidemic prevention and control, strategies to secure guest and staff safety were instrumental in the recovery of the hospitality industry (Loi et al., 2020). Industry and academia tried to find technology-based service options that could be used to minimize human-to-human contact (Tuzovic and Kabadayi, 2018). Owing to its ability to eliminate the direct involvement of service staff (Meuter et al., 2000), artificial intelligence (AI)-based self-service technology (SST) stands out (Gursoy and Chi, 2020; Yang et al., 2020). Various SSTs such as digital keys, service robots, self-service kiosks, smart speakers and drones have consistently drawn attention throughout the COVID-19 pandemic (Choe et al., 2021; Gursoy and Chi, 2020; Kim, Kim and Hwang, 2021; Loi et al., 2020). These technologies have a common feature: they allow customers to receive or produce services independent of the direct involvement of service employees, thus gaining the name SSTs (Meuter et al., 2000). Although prior research has focused on organizational and individual adoption of SSTs (Kim and Qu, 2014; Liu et al., 2020), investigation concerning the effectiveness of SSTs in a disrupted environment and the extent to which these SSTs were newly introduced in response to COVID-19 or had been in usage before the pandemic for Competitive Productivity (CP) is scarce.

When unanticipated and disruptive changes (e.g. COVID-19) occur, businesses are naturally inclined to renew or update their stock of resources to achieve a novel fit within the new environment (Colombo et al., 2020; Pappas and Glyptou, 2021). COVID-19 has given rise to several changes including service innovation motivations and practices (Heinonen and Strandvik, 2020). In a survey, 60% of participants recognized changes or adjustments due to the pandemic (Duarte et al., 2020). Nonetheless, how and why hotels make such changes remains unclear. Therefore, this study aims to break the seal of how hotels evolve their capabilities to make strategic decisions and adjustments on SST application to gain CP during unprecedented crises such as the COVID-19 pandemic.

Dynamic capabilities are a viable means for firms to integrate, extend, modify and reconfigure internal and external resources in adapting to rapidly changing and turbulent environments (e.g. COVID-19 crisis), thus ensuring long-term CP (Pavlou and El Sawy, 2011; Redding, 2020; Teece, 2007). Nonetheless, a content-oriented approach alone may not reveal the full picture of a hotel’s recovery strategy for the COVID-19 pandemic based on SSTs. It is inadequate to simply possess capabilities to create innovation (Nieves et al., 2016). The key lies in the strategy, the formulation, selection, adjustment and implementation of which enables adaptive responses to changes as they occur (Sołoducho-Pelc, 2015). Thus, a
process-oriented method highlighting how managers formulate and implement strategies is included in the current study (Köseoglu et al., 2019).

Thus, this study explores hotels’ utilization of SST as a recovery strategy from two perspectives. On the one hand, dynamic capabilities represent the content-oriented approach, which emphasizes the importance of unique resources and good strategy (Otengei et al., 2017). This approach seeks to understand how hotels evolve their capabilities to adapt to turbulent environments (Coreynen et al., 2020). On the other hand, the strategic management process aims to understand how hoteliers conduct strategic analysis and make a strategic selection, adjustment and implementation. Such an integrated approach supplements the shortcomings of dynamic capabilities, which seems to overlook the process of strategic management. The findings inform hotel practitioners how to leverage technologies to recover from the impacts of the COVID-19 pandemic and to gain long-term CP according to their own dynamic capabilities.

2. Literature review

2.1 Hospitality industry’s crisis management of COVID-19

Crisis management is prevalent in tourism and hospitality research (Lai and Wong, 2020), as it is an important determinant of firm sustainability (Her and Rodrigues, 2021). A hotel’s response to a crisis could be directly associated with its image, survival and prosperity (Lai and Wong, 2020). Therefore, learning and managing crises and developing recovery strategies are necessary for hoteliers (Her and Rodrigues, 2021). The COVID-19 pandemic, which has devastated the hospitality industry (Baum et al., 2020; Hao et al., 2020; Zenker and Kock, 2020), is a good example of a crisis. To fight against the highly contagious disease, people are advised to restrict unnecessary trips and practice social distancing. With the drastic decrease in customer demand, hotel room rates and occupancy percentages have declined proportionally (Lai and Wong, 2020). Industry and academia have attempted to determine measures and strategies to deal with the crisis.

In recent studies of crisis management regarding the effects of the COVID-19 pandemic on the hospitality sector, several crisis management frameworks have been proposed. For example, Hao et al. (2020) proposed a COVID-19 management framework to clarify the phases, principles and strategies behind the Chinese hotel industry’s crisis response to the pandemic. Le and Phi (2021) developed a strategic framework for hotel pandemic crisis management, consisting of COVID-19 phases, corresponding crisis management strategies and contextual factors. Duarte et al. (2020) suggested a theoretical framework to understand hospitality firms’ concerns and means for coping and adjusting. Giousmpasoglou et al. (2021) examined the influences of COVID-19, corresponding crisis management and the role of luxury hospitality general managers based on online interviews. These prior studies on the crisis management strategies of hotels to the COVID-19 pandemic have either discussed the industry’s responses in general (Hao et al., 2020; Her and Rodrigues, 2021; Knight et al., 2020; Lai and Wong, 2020; Le and Phi, 2021) or focused on specific response strategies such as revenue management (Denizci Guillet and Chu, 2021), technology implementation (Lau, 2020) and corporate social responsibility (Qiu et al., 2021).

Despite the contributions of these studies to the overall survival of the hotel industry throughout the COVID-19 pandemic, the majority of the extant research has concentrated on impacts and responses. Only a few have investigated how and why hotels formulate such strategies. After a long period of consistent growth, the hospitality sector’s level of readiness for crises (e.g. COVID-19 pandemic) was relatively low (Yacoub and ElHajjar, 2021). Therefore, when a certain type of crisis happens, detailed decision practices of recovery strategy for reference are lacking. Deliberate and
rigorous research on COVID-19 crisis management is needed (Lai and Wong, 2020; Zenker and Kock, 2020). Thereby, taking the SST application as an example, this study aims to unveil how hotels update their dynamic capabilities to make strategic decisions and adjustments in the aftermath of the COVID-19 pandemic. Considering the severity of the COVID-19 pandemic, such timely research on how hotels formulate recovery strategies can offer a valuable reference for future pandemic crises.

2.2 Self-service technology as a recovery strategy

Recently, many technology-based services have demonstrated the potential to supplement or replace personal services (Bitner et al., 2000; Shin and Perdue, 2019). In regard to efficiency, productivity, savings and profits, saved labor costs, service quality, customer control and customer satisfaction, hoteliers have introduced a variety of technologies such as self-check-in/check-out kiosks, voice-control system and service robots (Chen et al., 2015; Karadag and Dumanoglu, 2009; Liu and Hung, 2021). Owing to its ability to reduce contact between customers and service employees, the advantages of SST in achieving social distancing, enhancing cleanliness, reducing customers’ perceptions of health risk, anxiety and sense of isolation have been highlighted amid the COVID-19 pandemic (Cheng et al., 2021; Shin and Kang, 2020). SST is, thus, regarded as an effective risk-reduction strategy for managing the effects of COVID-19 in the hospitality industry (Shin and Kang, 2020).

The pandemic appears to have increased the speed of technological infiltration into the service industry (Jiang and Wen, 2020). Scholars anticipated that individual and organizational needs for and acceptance of contactless service based on technology would increase due to COVID-19 (Lau, 2020; Zeng et al., 2020). Kim et al. (2021) examined the influences of the pandemic on customer preference for robot service versus human services. Their results quantitatively suggested that a high perceived risk of COVID-19 increased customers’ positive evaluation of a robot-staffed hotel. Kim, Kim and Hwang (2021) observed the moderating effects of the COVID-19 outbreak on the relationship between customers’ attitude toward and behavioral intentions to use drones for food delivery. These studies have enhanced our understanding of how the COVID-19 pandemic influences customers’ acceptance of high technology. Nonetheless, the influences of COVID-19 on organizational adoption of technology are largely unknown, despite the claim by Yacoub and ElHajjar (2021) that hotels are expected to make operations more technologically aligned and focused.

Given that the introduction of high technology in hospitality is an industrial trend (Kim et al., 2021; Liu et al., 2020), until now the challenge has been to force firms to implement these features (Kabadayi et al., 2020). Little is known about how and when hotels make decisions on the application of technology-based contactless services in response to COVID-19 (Kabadayi et al., 2020). Organizational application of technology is much more complicated than customer acceptance and warrants further research investigation (Liu et al., 2020). A hotel’s investment in technology involves adoption decisions, practical implementation and customer feedback (Liu et al., 2020). Moreover, technological factors, organizational facets, environmental context, customer differences and task characteristics all exert influence on hotels’ adoption and implementation of SST (Liu et al., 2020). Similarly, Liu and Hung (2021) revealed that hotelier preference for SSTs is influenced by the complex interplay among environmental, organizational, service encounter and customer experience factors.

However, due to the COVID-19 pandemic, existing problem-solving routines were of little use (Visentin et al., 2021). As the environment changed, firms need to renew or update their stock of resources to achieve a novel fit with the environment and to reach a state of long-
term CP (Ambrosini and Bowman, 2009; Colombo et al., 2020; Nieves et al., 2016). When an environmental jolt occurs, firms will be naturally inclined to use their dynamic capabilities to change their resource configuration so as to fit with the new environment (Colombo et al., 2020). The COVID-19 pandemic is a good example of an environmental jolt, which is defined as a major unanticipated and disruptive change (Colombo et al., 2020). Tourism and hospitality managers have admitted that changes or modifications were made to adapt to the pandemic (Duarte et al., 2020). Service innovation is no exception to these changes (Heinonen and Strandvik, 2020). Therefore, investigating how the pandemic forced hotels to update their resources to formulate, adjust and roll out technology-based strategies in adapting to the sudden outbreak is worthwhile (Tuzovic and Kabadayi, 2018).

2.3 Self-service technology and competitive productivity

SST-based transactions are important sources of competitive advantage and productivity improvement in a turbulent environment (Breier et al., 2021; Chen and Lin, 2020). The profits of technology diffusion can persist for many years before the forces of competition render them no longer useful (Teece, 2007). Thus, they are key to long-term business success (Taillon and Huhmann, 2019). In this respect, a hotel’s ability to use SST in response to COVID-19 is not only a quick crisis management measure for the pandemic alone but also a strategic advantage to gain long-term competitiveness and productivity (Baumann et al., 2019; Ruan et al., 2020). This is in line with the suggestion that hotels should not only acquire new strengths in response to the COVID-19 pandemic but also prepare for the new world’s competition (Yang and Han, 2021).

Productivity and competitiveness have each been explored extensively, but with a limited concentration on the integration of the two concepts (Baumann et al., 2019). A honed concentration on productivity alone may be detached from the competition and vice versa (Baumann et al., 2019). In fact, competitiveness and productivity are often used interchangeably in economic policy documents and reports (Chen and Lin, 2020). Given the entanglement of productivity and competitiveness, CP was first coined by Baumann and Pintado (2013) as “in essence both an attitude and a behavior directed at beating the competition” (Baumann and Pintado, 2013, p. 10).

To create an innovative way of integrating productivity and competitiveness, much more work is warranted to bring CP into full bloom (Baumann et al., 2019). Baumann et al. (2019) proposed a three-level model (micro–meso–macro) to clarify CP and delimited a firm-level CP as talent management, resource management, corporate culture and brand management (Baumann et al., 2019). Hoadley (2020) leveraged systemic functional linguistics (instantiation, stratification and system) to further conceptualize CP as a multilevel and multidimensional system and pointing out that Firm Competitive Productivity (FCP) involves productivity to increase its market share, thus excelling its competitive advantage (Hoadley, 2020).

CP has long been established as essential to the survival of a firm (Baumann et al., 2017), whereas how to accumulate resources to enhance CP remains unclear, particularly during the COVID-19 pandemic (Redding, 2020). CP and dynamic capabilities are essential in understanding international competitiveness (Buitrago and Barbosa Camargo, 2021). The current research integrated CP with dynamic capabilities to understand how hotels evolve their abilities to leverage technology recovery strategy to gain CP.

3. Theoretical development and problem statement

3.1 Dynamic capabilities

Dynamic capabilities refer to a “firm’s ability to integrate, build and reconfigure internal and external competencies to address rapidly changing environments” (Teece et al., 1997, p. 516).
More than two decades past, the concept of dynamic capability has garnered increased attention and has become one of the most influential theoretical frameworks in contemporary management research (Kump et al., 2019). Thus, dynamic capabilities are the organizational and strategic routines by which firms attain new resource configurations as the environment changes (Ambrosini and Bowman, 2009). The standard resource-based viewpoint emphasizes selecting resources in a static view (Ambrosini and Bowman, 2009; Pavlou and El Sawy, 2011). Dynamic capability extends the static view by unveiling the mechanisms through which firms modify their existing resources (Pavlou and El Sawy, 2011).

As a rule of thumb, dynamic capabilities “are themselves unstable” (Eisenhardt and Martin, 2000, p. 1118). They help explain how successful firms demonstrate timely responsiveness and flexible service innovation to match complex and rapidly changing environments (Ambrosini and Bowman, 2009; Kump et al., 2019; Pavlou and El Sawy, 2011). Dynamic capabilities enable firms to achieve strategic change and renewal, conducive to long-term performance and sustainable competitive advantages (Camisón and Monfort-Mir, 2012; Kump et al., 2019; Teece, 2007).

However, prior research has concluded that the performance benefits of dynamic capability are not automatic but depend on diverse environmental contingencies (Colombo et al., 2020). A major challenge for managers in turbulent environments is to make rational decisions quickly (Pavlou and El Sawy, 2011). The ability to react and prepare does matter in terms of crisis management (Her and Rodrigues, 2021). Nonetheless, managers may be unaware of the existence of dynamic capabilities (Pavlou and El Sawy, 2011). Therefore, examining hotels’ capabilities amid the COVID-19 pandemic is important. Given that dynamic capabilities must be combined with adequate strategy (e.g. SST recovery strategy) to be effective (Amui et al., 2017), this study explored how the pandemic forced hotels to update their resources to formulate, adjust and roll out technology-based strategy to adapt to the COVID-19 pandemic. This study was drawn on Pavlou and El Sawy’s, (2011) measurable model of dynamic capabilities, including:

- Sensing capability refers to sensing environmental changes, customer needs, competitor moves and technology developments;
- Learning capability refers to creating new knowledge based on information gathered via sensing capability;
- Integrating capability refers to integrating new resources with existing resources, including knowledge and resources of different departments; and
- Coordinating capability refers to assigning SSTs and human staff to appropriate tasks and orchestrating SSTs and human staff.

3.2 Strategic management process
Research on strategic management divides into two streams. The first stream focuses on the content of strategic management, in regard to how firms gain competitive advantages in the market (Köseoğlu et al., 2019). The second stream examines the process of how managers formulate and implement strategies (Köseoğlu et al., 2019). A recent literature review revealed that strategic management research in hospitality and tourism was mainly based on a content-oriented approach rather than a process-oriented approach (Köseoğlu et al., 2019). Moreover, limited research has jointly investigated the adoption process and its corresponding content.
Sole concentration on the content-oriented perspective may not fully reveal a true picture of hotels’ SST-based recovery strategy in response to the COVID-19 pandemic. Strategy is often regarded as a process because “it is never a once-and-for-all event – it goes on and on” (Evans, 2020, p. 2). To address the need for long-term development and the necessity of adapting to the variability of the environment, organizations should adopt strategic management procedures (Soloducha-Pelic, 2015). The practice of strategic management allows finding sound responses to occurring changes (Soloducha-Pelic, 2015). Strategic management, thus, involves the process through which a firm rationally uses resources to fit into its environment to create and sustain a competitive advantage (Evans, 2020; Köseoglu et al., 2019; Okumus et al., 2010).

As a stage-based process, strategic management can be divided into distinct “stages” (Evans, 2020). For example, Montanari and Bracker (1986) described that the strategic management process involves three stages: context analysis, implementation strategy and evaluation strategy. Okumus et al. (2010) categorized the strategic management process in hospitality and tourism into four phases, namely, strategic analysis, strategy formation, strategy implementation and strategy control. Similarly, Evans (2020) stated that the strategic management process in hospitality and tourism usually involves three stages; strategic analysis, strategic selection and strategic implementation. The strategic analysis involves the examination of the strategy, whereas strategic selection consists of the formulation and evaluation of strategic options and selection of the most appropriate strategic option based on strategic analysis (Evans, 2020). The last stage of the strategic management process is strategic implementation and management. It entails putting the detailed aspects of the selected strategic options into practice and brings into focus several other managerial issues (Evans, 2020). These managerial issues are composed of resource adequacy, culture and structure, leadership and management and communication (Evans, 2020). In summary, drawn from dynamic capability theory and Evans’s (2020) strategic management process, the present research aims to explore (Figure 1):

\[ RQ1. \] How do hotels adjust the implementation of SST-based contact-less services to respond to COVID-19?

\[ RQ2. \] Why do hotels make such adjustments?

\[ RQ3. \] What is the performance of these adjustments?

![Research framework](image.png)
4. Methodology

To break the seal of how hotels evolve their capabilities to apply SSTs to respond to the COVID-19 pandemic, a qualitative method was adopted because of its compatibility with the investigation of behavioral changes and as-yet-unknown reasons (Logie-MacIver et al., 2012; Waller et al., 2016). Under the constructivist paradigm, a qualitative study enables the researcher to explore realities residing in the minds of participants and are locally created, thus leading to a deeper understanding of realities existing in the context being investigated (Guba and Lincoln, 1994; Waller et al., 2016). An interpretive approach was adopted to understand hotels’ experiences and meanings regarding how strategic changes are formulated to achieve CP as suggested by Baumann et al. (2019).

Specifically, this study conducted in-depth interviews with hotel managers to understand hotels' SST-based recovery strategy to achieve CP (Baumann et al., 2019). Interviews allow a deep and detailed investigation of responses by asking follow-up questions (Veal, 2011). The rich data obtained from in-depth interviews help examine and unveil previously unexplored processes (Liu and Hung, 2021). Therefore, we conducted in-depth interviews to uncover organizational dynamic capabilities associated with each strategic management stage. Moreover, understanding real-life scenarios is crucial for any study. The authors have visited and stayed in smart hotels to observe SST-based contact-less service applications.

The key to triangulation lies in multiple viewpoints that can be reached via purposefully recruiting different types of participants (Willis, 2007). Thus, 14 hotel managers from hotels associated with varying degrees of intelligence were purposefully selected and invited (Table 1). A diverse set of organizations from different cities in China was chosen in response to the recommendation to eliminate the limitations of examining only one hospitality organization and to ensure validity and reliability (Cobos et al., 2016). Interviewing managers from different types of hotels offers the opportunity to compare the dynamic capabilities for SST applications. Table 1 shows that six of the 14 participants managed hotels that are minimally staffed by SSTs; five represented hotels staffed partially by SSTs and three managed hotels staffed mostly by SSTs. The sample sizes were consistent with previous influential qualitative research methodology recommendations (Shapoval et al., 2021). Specifically, Dukes (1984) recommended 3–10 participants. Interviews in the present study were ceased when the information began to appear

<table>
<thead>
<tr>
<th>Informant number</th>
<th>Gender</th>
<th>Position</th>
<th>Hotels’ degree of intelligence</th>
<th>Hotel location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Male</td>
<td>General manager</td>
<td>Minimal</td>
<td>Chengdu</td>
</tr>
<tr>
<td>2</td>
<td>Female</td>
<td>General manager</td>
<td>Partial</td>
<td>Shenzhen</td>
</tr>
<tr>
<td>3</td>
<td>Male</td>
<td>General manager</td>
<td>Partial</td>
<td>Nanjing</td>
</tr>
<tr>
<td>4</td>
<td>Male</td>
<td>Owner deputy general manager</td>
<td>Minimal</td>
<td>Wuhan</td>
</tr>
<tr>
<td>5</td>
<td>Male</td>
<td>Sales and marketing director</td>
<td>Partial</td>
<td>Hangzhou</td>
</tr>
<tr>
<td>6</td>
<td>Female</td>
<td>Business development specialist</td>
<td>Minimal</td>
<td>Shanghai</td>
</tr>
<tr>
<td>7</td>
<td>Male</td>
<td>Vice president</td>
<td>Most</td>
<td>Hangzhou</td>
</tr>
<tr>
<td>8</td>
<td>Female</td>
<td>Regional general manager</td>
<td>Minimal</td>
<td>Jinan</td>
</tr>
<tr>
<td>9</td>
<td>Male</td>
<td>Regional general manager</td>
<td>Minimal</td>
<td>Beijing</td>
</tr>
<tr>
<td>10</td>
<td>Male</td>
<td>Front office manager</td>
<td>Minimal</td>
<td>Guiyang</td>
</tr>
<tr>
<td>11</td>
<td>Male</td>
<td>Director of sales and marketing, pre-opening and re-branding</td>
<td>Partial</td>
<td>Hangzhou</td>
</tr>
</tbody>
</table>

Table 1. Participant demographics
repeatedly indicating adequate saturation to answer the established research questions (Waller et al., 2016).

With participants’ consent, one of the authors contacted and made appointments with each participant. The in-depth interviews were conducted from May 2020 to December 2020. After a brief introduction of the research, participants were encouraged to express and explain their opinions in detail and from three perspectives. The first perspective focused on the influences of COVID-19 on hotels’ dynamic capabilities. The second sought insights into how hotels make decisions regarding SST introduction, application, implementation, feedback and adjustment in response to COVID-19. The last perspective focused on the performances of the adjustments. Hotel managers’ opinions are not only useful for the decisions on practical strategies but also important in enriching academic literature (Duarte et al., 2020). The SSTs investigated in this study include self-check-in/out kiosks, digital check-in/out, digital/facial recognition room keys, smartphone app/mobile tablet for in-room facilities control, voice-control systems (i.e. smart speaker) and robots. The average duration for each interview lasted approximately 35 min. All audio interviews were recorded and then transcribed literally with the interviewees’ permission.

Thematic analysis was used to analyze the interview data. Thematic analysis is particularly useful and successful in similar contexts (Liu et al., 2020). The analysis procedures were drawn from techniques suggested by Gioia et al. (2013). First, the raw data were coded and each code was labeled reflecting what it represented. Codes were then allocated to corresponding subthemes followed by higher aggregate themes. All data with similar meanings were divided into the same category. That is, similarities and differences serve as the standards of coding (Harding, 2013). In cases of discrepancy, the authors discussed the results of the data analysis until reaching a consensus (Jones, 1995). Moreover, consistency over time was adopted to secure the reliability of the data analysis (Prothro, 1956). That is, data analysis was conducted more than once. The initial coding and data analysis were conducted in October 2020, while a repetitive analysis was performed in January 2021.

Finally, using NVivo 11 and based on the keywords and original meanings expressed by participants, five, three, two and three subthemes were assigned to sensing, learning, integrating and coordinating capabilities, respectively (Table 2). In addition, Tables 3 to 5 present the summary of themes and subthemes regarding the strategic management process. Table 6. presents the respondents’ opinions regarding strategy performance.

5. Findings and discussions
The findings answered the research questions. These findings uncovered hotels’ capabilities to integrate, build and reconfigure resources to respond to the COVID-19 pandemic. Additionally, the data analysis of interview information revealed the three-stage strategic management process and the outcomes of each process stage. The first stage analyzes the SST-based strategy. The second stage is the decision made by hotels concerning whether or not to adjust the SST-based strategy. The last stage is the implementation of the adjustment and evaluation of the implementation. Moreover, the data analysis revealed the performances (e.g. CP) of the SST-based recovery strategy. The following presentation cites examples and excerpts from the in-depth interviews.

5.1 Dynamic capabilities amid the COVID-19
5.1.1 Sensing capability amid the COVID-19. The data analysis showed that hotels have the capability to sense technology development, SST usage by intra-industry and inter-industry, customer needs and government regulations and support (Table 2). Technology
Typical opinions of the participants regarding the hotel’s dynamic capabilities

<table>
<thead>
<tr>
<th>Themes</th>
<th>Subthemes</th>
<th>Hoteliers of hotels staffed mostly by SSTs</th>
<th>Hoteliers of hotels staffed partially by SSTs</th>
<th>Hoteliers of hotels staffed minimally by SSTs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensing</td>
<td>Fast tech development</td>
<td>Tech will be increasingly perfect (P13)</td>
<td>Improved hotels’ needs for contactless tech (P2, 3)</td>
<td>Tech develops and evolves fast (P6)</td>
</tr>
<tr>
<td></td>
<td>Increased usage in other industries</td>
<td>Numerous shopping stores use SSTs (P14)</td>
<td>Improved usage by hotels (P9)</td>
<td>Improved usage by hotels (P9)</td>
</tr>
<tr>
<td></td>
<td>Improved application in hotels</td>
<td></td>
<td>Improved customers’ needs for contactless tech (P6)</td>
<td>Improved customers’ needs for contactless tech (P6)</td>
</tr>
<tr>
<td></td>
<td>Improved customer needs</td>
<td></td>
<td>Improved customers’ needs for tech for higher efficiency (P10)</td>
<td>Improved customers’ needs for tech for higher efficiency (P10)</td>
</tr>
<tr>
<td></td>
<td>Government regulations</td>
<td>Disinfect frequently (P14)</td>
<td>Show digital health codes (P5)</td>
<td>Practice social distancing (P4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wash hands (P14)</td>
<td></td>
<td>Show digital health codes, communication codes and health certificate (negative result) (P4, 6, 10)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Obtain guests’ body temperature (P10)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Disinfect frequently (P9, 10)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Wash hands (P4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Easing of lockdown (P8)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Employees are incompetent (P1)</td>
</tr>
<tr>
<td>Learning</td>
<td>Government support</td>
<td>Employees lack knowledge of tech (P7)</td>
<td>Safety outweighs efficiency (P9)</td>
<td>Safety outweighs efficiency (P9)</td>
</tr>
<tr>
<td></td>
<td>Employees are unsatisfactory</td>
<td>Employees are incompetent (P7)</td>
<td>From serving as stunts to offering safety (P9)</td>
<td>From serving as stunts to offering safety (P9)</td>
</tr>
<tr>
<td></td>
<td>Advantage of reducing contact stands out</td>
<td>Advantage of reducing contact stands out during the COVID-19 pandemic (P13)</td>
<td>Contributions to learning customers’ habit are important (P1)</td>
<td>Contributions to learning customers’ habit are important (P1)</td>
</tr>
<tr>
<td></td>
<td>Other values aside from reducing contact take effect</td>
<td>Other values aside from reducing contact take effect (P13)</td>
<td>Declined revenue (P3, 12)</td>
<td>Declined revenue/capital chain rupture (P8, 10, 11)</td>
</tr>
<tr>
<td>Integating</td>
<td>Declined revenue</td>
<td>Declined revenue (P13, 14)</td>
<td>SSTs emerge when the economy is good (P11)</td>
<td>Owner’s budget and disagreement (P1)</td>
</tr>
<tr>
<td>capability</td>
<td></td>
<td></td>
<td></td>
<td>Lack of budget to transform space (P1, 9, 10, 11)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Not suitable for front office (P10)</td>
</tr>
<tr>
<td></td>
<td>Support from the IT team</td>
<td>Support from the IT research team (P14)</td>
<td>Incompatible with corporate culture (P1) and hotel position (star level) (P4, 10)</td>
<td>Incompatible with corporate culture (P1) and hotel position (star level) (P4, 10)</td>
</tr>
<tr>
<td>Coordinating</td>
<td>Compatibility with tasks</td>
<td>Compatibility with organizational structure and post setting (P13)</td>
<td>Consider prior tech strategy (P13, 14)</td>
<td>Consider prior tech strategy (P10)</td>
</tr>
<tr>
<td>capability</td>
<td>Compatibility with corporate culture and position</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Compatibility with strategy</td>
<td>Consider hotel position and category (P13)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Compatible with prior tech strategy (P13, 14)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: tech = technology; P = participant
develops and evolves fast (Participant 6); hence, technological development will ensure a more perfect fit in the future (Participant 13). Apart from hotels, other establishments (e.g. Ikea and Uniqlo) have increased usage of SSTs (Participants 9, 14). Moreover, hoteliers noted their increased need, as well as that of customers’, for contactless service due to COVID-19 (Participants 2, 3, 6). This finding provides supports for prior academic anticipation that individual and organizational needs for contactless service based on technology would increase because of the pandemic (Lau, 2020; Zeng et al., 2020). Customers also expect to gain higher efficiency via technology (Participant 10).

Moreover, China spared no efforts to contain the novel coronavirus. Hoteliers expressed that the recovery of the hotel industry depended on the government’s policy guidance and support. As the situation improved, the government replaced lockdown with common regulations (Participants 8). The Chinese government advised customers to practice social distancing, show digital health codes, communication (stroke/tracing) codes and (negative) health certificates upon checking in (Participants 4, 6, 10). Hotels are suggested to obtain customers’ body temperature and promote proper disinfection and frequent handwashing (Participants 4, 9, 10, 14). These government guidelines not only secure customer safety but also motivate the introduction of technologies that are directly related to mitigating the impacts of the pandemic. For example, a hotel introduced a queuing system to manage the queue and proactive social distancing (Participant 4).

This remark appears inconsistent with a recent study on SST adoption in China (Liu and Hung, 2021). The recent research revealed that the hotels’ adoption of SSTs was inhibited by the Chinese government’s check-in regulations on real-time uploads of guests’ identification information (Liu and Hung, 2021). However, this study revealed that when an environmental jolt (e.g. COVID-19) happens, government regulations and support catalyze SST adoption. Therefore, it seems that the influences of government regulations and support on organizational adoption of SSTs depend on the environment and SST type, unveiling new research directions. This is consistent with the prior argument that a firm’s technology and its capability to transfer technology into CP were associated with the firm’s national and global capabilities (Buitrago R and Barbosa Camargo, 2021; Teece, 2014).

5.1.2 Learning capability amid the COVID-19. According to the information gathered via sensing capability, hoteliers created new knowledge and indicated that employees are unsatisfactory. In their opinions, employees lack knowledge of technology and are incompetent (Participant 7). By contrast, SSTs’ advantages stand out amid the pandemic. In the past, SSTs (e.g. service robots) were usually regarded as selling points to attract customers, consistent with prior studies (Liu et al., 2020; Liu and Hung, 2021). During the pandemic, SSTs were praised due to their contribution to reducing contact and improving the safety of people (Participants 9, 13). The comparison between unsatisfactory employees and respected SSTs offers support for the past research that when making decisions on SST adoption, hoteliers usually compared SST-based services with human services (Liu and Hung, 2021).

Aside from reducing contact, hoteliers attached importance to SSTs’ other advantages (Participant 9, 13). As mentioned in the literature, service firms invest in various SSTs for the sake of better service quality, customer experience, operation efficiency and reduced cost (Kim and Qu, 2014; Shin and Perdue, 2019). Therefore, even amid the COVID-19, it appeared hoteliers were not adopting these technologies simply because of the pandemic:

If a technology only contributes to fighting against the pandemic, then it is not going to be of any value to me after the pandemic. The key lies in that the technologies I deployed are certainly just right for some aspects of the pandemic. Reduced contact is only one of the SSTs’ values and they are certainly valuable in other ways as well. (Participant 3).
5.1.3 Integrating capability amid the COVID-19. The hotel industry is one of the biggest casualties of the COVID-19 pandemic. Owing to the decreased guest volume, hotels’ income declined dramatically. Some hotels even closed as early as February to March 2020. Even so, hotels maintained payment of employee salaries and operational costs. Under such a condition, hotels did not have enough money to buy new SSTs, nor to transform the space required to introduce SSTs (e.g. robots). Hotel SSTs flourish in a good economic environment. For example, participant #11 mentioned that the world’s first futuristic hotel – the FlyZoo Hotel – opened in late 2018 when the economy of China was good. By contrast, hotels’ financial resources for SST applications were damaged by the COVID-19 pandemic. Although SSTs stand out during the pandemic, hotels may not buy new SSTs due to declined resources. This observation is consistent with existing research that in normal times, hospitality firms might have failed to introduce SSTs due to limited financial opportunities and capacities (Breier et al., 2021; Liu and Hung, 2021), not to mention within a period of profit decline.

On the one hand, a hotel with an IT team might allocate more resources to develop and accelerate the application of SSTs (Participant 14). On the other hand, consistent with the study of Liu and Hung (2021) which was conducted in a normal environment, understaffed IT departments and owners’ budgetary restrictions exert negative effects on hotels’ adoption of SSTs. Thus, hoteliers demonstrated the hotel’s capabilities of integrating and reconfiguring resources.

5.1.4 Coordinating capability amid the COVID-19. Hotels’ coordinating capabilities were reflected in the configuration of SSTs and human staff. First, hotels needed to think about the fit between SST and the task. For instance, hotelier #10 said that SSTs are not suitable in the front office because SSTs lack emotions in the provision of services. Some hoteliers mentioned that their corporate culture or hotel position, which entailed high-touch service, restricted their usage of SSTs. For example, SSTs seemed compatible with 5-star hotels, where customers expect customized and hospitable services. By contrast, participants #13 and #14 said that their increased application of SSTs is compatible with their prior technology strategy. Participant 13 further added, “The pandemic simply brought the technology strategy forward.” Therefore, before making decisions on an SST-based recovery strategy for the COVID-19 pandemic, hotels are encouraged to evaluate whether their coordinating capability is synchronized with their financial readiness, hotel position, culture and strategy (Liu and Hung, 2021).

5.2 Analysis of self-service technology-based strategy

5.2.1 Pros of self-service technology-based strategy. The strategic analysis in the present study involves the examination of the pros and cons of the SST-based strategy (Table 3). According to participants, SSTs exert positive and negative influences. Consistently, managers from all types of hotels agreed that SSTs can help reduce contact between customers and employees (Participants 1, 2, 3, 6, 9, 13, 14). Therefore, the risk of COVID-19 inflection was decreased, thus securing customers’ and employees’ safety. SSTs can also be conducive to reducing employees’ workloads without affecting their salaries (Participants 2, 3). “We need to release more and more employees from repetitive tasks while allocating human staff to do more meaningful things” (Participants 13). This sentiment is consistent with the suggestion of Liu et al. (2020) that saved labor can be allocated to serve customers.

In contrast to the improved efficiency mentioned in previous literature (Liu et al., 2020; Liu and Hung, 2021), informants from this study claimed that the changes that SSTs brought into work efficiency rely on situational factors and the type of SSTs. For instance, the efficiency of a robot may be lower than that of human services, as it moves walks slower...
<table>
<thead>
<tr>
<th>Themes</th>
<th>Subthemes</th>
<th>Hoteliers of hotels staffed mostly by SSTs</th>
<th>Hoteliers of hotels staffed partially by SSTs</th>
<th>Hoteliers of hotels staffed minimally by SSTs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pros of SST-based strategy</td>
<td>Reduce contact and, thus, improve safety  Improve employees’ well-being</td>
<td>• Reduce contact and, thus, improve safety (P13, 14)</td>
<td>• Reduce contact and, thus, improve safety (P2, 3)</td>
<td>• Reduce contact and, thus, improve safety (P1, 6, 9)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Enable stable work efficiency (P7)</td>
<td>• Reduce workload without affecting salary (P2, 3)</td>
<td>• Improve work efficiency (P4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Improve work efficiency (P14)</td>
<td>• Improve work efficiency (P3, 11)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Evoke feelings of novelty, fun and convenience</td>
<td>• Improved customers’ perceptions (P14)</td>
<td>• Evoke feelings of novelty, fun and convenience (P3, 5)</td>
<td>• Evoke feelings of novelty, fun and convenience (P1, 4, 9, 10)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Release staff to do more meaningful tasks (P13, 14)</td>
<td>• Original astonishment has waned (P11)</td>
<td>• Original astonishment has waned (P9)</td>
</tr>
<tr>
<td>Cons of SST-based strategy</td>
<td>Save labor cost</td>
<td>• Saved labor cost (P14)</td>
<td>• Improve requirements for employees’ overall quality (P3)</td>
<td>• Learn about the new SST-based service process (P4)</td>
</tr>
<tr>
<td></td>
<td>High cost</td>
<td>• High investment cost (P7)</td>
<td>• High purchase or rental cost (P3)</td>
<td>High purchase or rental cost (P1, 9)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Increase employees’ learning cost (P13)</td>
<td>• High cost for space transformation (P3, 11)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Imperfect technology</td>
<td>• Non-versatility/single-function nature</td>
<td>• Single-function nature (P2, 5)</td>
<td>• Service failure (P1, 9)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Standardized service without emotions (P7, 13)</td>
<td>• Needs maintenance (P3)</td>
<td>• More anxiety than convenience (P1)</td>
</tr>
<tr>
<td></td>
<td>Incomplete contactless service</td>
<td></td>
<td></td>
<td>• Employees’ unwillingness to deal with service failure caused by SSTs (P9)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• SSTs are not intelligent enough (P9)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Not versatile (P1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Single-function nature (P1, 9)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Standardized service without emotions (P1, 4, 10)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Customer–machine–employee contact is necessary (P4)</td>
</tr>
</tbody>
</table>

**Note:** P = participant

**Table 3. Typical opinions of the participants regarding strategy analysis**
than humans (Participant 4). Nonetheless, a robot contributes to efficiency during night shifts and peak periods (Participant 11). By contrast, the self-service ordering system helps enhance efficiency by involving fewer service delivery steps. “Armed with this [self-service] ordering, customers can make orders on the hand-held terminal. Then the order will be automatically sent to our catering ordering system and cashier system” (Participant 4). Moreover, participant #7, who is from a hotel staffed mostly by SSTs, highlighted the overall degree of efficiency brought by SSTs. In his view, as SSTs’ work efficiency is more stable than that of human staff, the overall operation efficiency will be enhanced.

Another advantage lies in customer experience. Managers from all types of hotels highlighted that SSTs (e.g. robots) can evoke feelings of novelty, fun and convenience (Participants 1, 3, 4, 5, 9, 10). However, participants #9 and #11 indicated that with the increasing prevalence of SSTs, people’s astonishment at SSTs has waned. Moreover, participant 1 shared his own experience to criticize SSTs’ service failure. In his view, the negative influences of anxiety and bad experience resulting from service failure were greater than those aforementioned benefits. However, informant 3, who has deployed robots in his hotel, mentioned that SST failure does not matter as robot companies offer maintenance services (Participant 3). Besides, the managers from a hotel staffed mostly by SSTs mentioned that their use of SSTs is justified by their saved labor cost (Participant 14).

5.2.2 Cons of self-service technology-based strategy. The disadvantages participants mentioned in regard to SSTs were consistent with prior research (Liu et al., 2020). The high investment cost is still one of the biggest barriers for hotels to adopt SSTs. All informants emphasized the high investment costs associated with the introduction of SSTs (Participants 1, 3, 7, 9). Aside from purchase or rental costs, hotels need to invest a large sum of money and time to transform their space layouts (e.g. elevators and stairs) to make robots suitable for the environment (Participants 3, 11). Another cost results from employees’ learning costs (Participants 3, 13).

The technology itself presents another drawback. Although technology develops and evolves fast, the current technology used in hotels is imperfect and far from intelligent (Participant 9). Their single-function nature, deficiency of practical usefulness, over standardization and lack of emotional service provision, make the current technologies unpopular in hospitality and tourism (Participants 1, 2, 4, 5, 7, 9, 13). Moreover, participant #4 argued that the reduced contact by SSTs is not entirely contactless service because customer–machine–employee contact is still necessary. In response, hotelier #13 has begun to conduct research on the effectiveness of SSTs to reduce contact and whether SST-based services are truly contactless. This subject, thus, opens a new research avenue for future studies.

5.3 Adjustment of self-service technology-based strategy

According to the strategic analysis, managers make minor adjustments to the SST-based strategy (Table 4). In general, hotels do not introduce new SSTs due to declined profits except for technologies that are directly related to mitigating the effects of the pandemic. For instance, participant #11 delayed their investment in technology as it is not urgent. Participant #7 from a hotel staffed mostly by SSTs stated that they do not need to make adjustments as his hotel has been staffed mostly by SSTs. By contrast, informant #13, the vice president of a hotel group, shared that they are accelerating the pace of introducing, promoting and implementing SSTs in all their hotels with the help of their own IT team.

Nonetheless, the SST strategy is not suddenly proposed due to the pandemic, but was approved for implementation beforeCOVID-19. The COVID-19 pandemic simply advanced
Table 4. Typical opinions of the participants regarding strategy adjustment

<table>
<thead>
<tr>
<th>Themes</th>
<th>Hoteliers of hotels staffed mostly by SSTs</th>
<th>Hoteliers of hotels staffed partially by SSTs</th>
<th>Hoteliers of hotels staffed minimally by SSTs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do not buy what they did not buy</td>
<td>• Do not introduce new SSTs <em>(P7)</em></td>
<td>• Delay investment in technology <em>(P11)</em></td>
<td>• Do not buy what they did not buy <em>(P1)</em></td>
</tr>
<tr>
<td>Accelerate the introduction of SSTs but not essentially or profoundly affecting the tech strategy</td>
<td>• Increase the introduction, promotion and implementation of SSTs <em>(P13)</em></td>
<td>• Not essentially or profoundly affecting the technology strategy <em>(P13)</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Do not suddenly introduce SSTs due to COVID-19 <em>(P13)</em></td>
<td></td>
</tr>
</tbody>
</table>

*Note: P = participant*

Table 5. Typical opinions of the participants regarding strategy implementation

<table>
<thead>
<tr>
<th>Themes</th>
<th>Subthemes</th>
<th>Hoteliers of hotels staffed mostly by SSTs</th>
<th>Hoteliers of hotels staffed partially by SSTs</th>
<th>Hoteliers of hotels staffed minimally by SSTs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deploy SSTs</td>
<td>• Stop usage as passenger volume dramatically decreased</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Increase usage frequency of implemented SSTs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Add new technologies that are related to mitigating the effects of the epidemic <em>(P13)</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Update back-office technologies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offer more resource support</td>
<td>• Increase staff training <em>(P7)</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Adjust resource allocation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Increase usage frequency of implemented SSTs <em>(P2, 3, 5)</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Promote sales through live video streaming <em>(P3)</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Add queuing system <em>(P4)</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Add SSTs in the parking lot <em>(P6)</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Update back-office technologies <em>(P8)</em></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note: P = participant*
the process of the strategy, rather than essentially or profoundly affecting the technology strategy. Hoteliers had been looking forward to the prevalence of SSTs in hotels in the future even before the pandemic (Liu et al., 2020). Although the application of high tech in hospitality is an inevitable trend (Liu et al., 2020), hotels’ adjustment of their SST strategies varies according to their dynamic capabilities. This finding indicates the necessity of examining hotels’ dynamic capabilities.

5.4 Implementation of the self-service technology-based strategy
In the detailed implementation and management of the selected strategic options, hoteliers indicated that their usage of SSTs that were implemented before the pandemic increased (Informants 2, 3, 5, 6; Table 5). However, Hotelier #12 from a hotel implementing service robots before the outbreak of COVID-19 expressed that they stopped the usage of robots as passenger volume dramatically decreased and they closed the hotel. Besides, hotels staffed minimally by SSTs added and updated some technologies related to mitigating the effects of the pandemic. For example, hotelier #8 shared that they updated back-office technologies. Hoteliers from hotels staffed partially by SSTs promote sales through live video streaming (Participant 3). Hoteliers from hotels staffed mostly by SSTs indicated that they offer resource support for the usage of SSTs. For example, Hotelier #7 mentioned that they increased staff training to help them learn to use SSTs. Hotelier #13 indicated that they allocate more resources to accelerate the development and implementation of new technology products.

5.5 Performance of self-service technology-based strategy
After the implementation of the SST-based strategy, hoteliers monitor feedback and make adjustments accordingly, which is consistent with prior research on the technology adoption process in organizations (Liu et al., 2020). Hoteliers’ perceptions of guest acceptance of SSTs are important (Liu et al., 2020). In light of practitioners in this study, customers’ evaluation of SSTs was improved (Table 6). In the past, customers usually criticized the lack of emotions

<table>
<thead>
<tr>
<th>Themes</th>
<th>Hoteliers of hotels staffed mostly by SSTs</th>
<th>Hoteliers of hotels staffed partially by SSTs</th>
<th>Hoteliers of hotels staffed minimally by SSTs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfied employees</td>
<td>● From passive to proactive attitudes (P7)</td>
<td>● Reduce workload without affecting salary (P2, 3)</td>
<td>● Expected by curious employees (P10)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Satisfied customers (P2)</td>
<td>● If employees’ attitudes are positive, then deploy it (P9)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>● From an initially negative to current good feedback (P9)</td>
</tr>
<tr>
<td>Satisfied customers</td>
<td>● From passive to proactive use (P13,14)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Give the right to use the SSTs to customers (P14)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improved efficiency</td>
<td>● Enable stable work efficiency (P7)</td>
<td>● Improve work efficiency (P3,11)</td>
<td>● Improve work efficiency (P4)</td>
</tr>
<tr>
<td></td>
<td>● Improve work efficiency (P14)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Release staff to do more meaningful tasks (P13,14)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduced labor cost</td>
<td>● Saved labor cost (P14)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Note: P = participant</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 6. Typical opinions of the participants regarding strategic performance
of SSTs. Today, they praised the contributions of SSTs toward enhanced safety during the COVID-19. Compared with prior passive use, customers begin to proactively use SSTs due to the COVID-19 pandemic (Participants 13, 14). In their opinion, SST is one of the approaches that provide contactless service by eliminating direct contact between customers and service employees. These findings offer support for a prior study that SSTs are an effective risk-reduction strategy in reducing the impacts of the COVID-19 pandemic (Shin and Kang, 2020).

In a similar vein, employees’ attitudes toward SSTs were greatly improved. In the past, front office staff indicated that the efficiency of self-service check-in kiosks is lower than their efficiency (Participant 9). They were reluctant to guide customers to use SSTs before the pandemic (Participant 9). However, nowadays, they are curious and expected to use SSTs as they can reduce their workload and minimize their contact with customers (Participants 2, 3, 10). Employee and customer satisfaction and loyalty are significant determinants of firm performance, exerting influences on firm profitability (Anning-Dorson, 2018; Yee et al., 2010). Thus, hoteliers also indicated they will adjust their SST strategy according to customers’ and employees’ attitudes toward SSTs (Participant 9). If they hold positive attitudes, then the hotel will consider the introduction of SSTs, augmenting the necessity and significance of integrating customers’, employees’ and hoteliers’ opinions.

Moreover, aside from reducing human-to-human contact, SSTs contribute to improving operational efficiency and reducing cost as mentioned earlier. Innovative technology appears prominently in both sets of the literature as an antecedent of productivity improvement and competitiveness (Chen and Lin, 2020; Karadag and Dumanoglu, 2009). The profits of technology diffusion can persist for many years before being competed away (Teece, 2007). SST-based transactions are key to long-term business success (Taillon and Huhmann, 2019).

6. Conclusion and implications
6.1 Conclusion
Based on dynamic capability theory and the strategic management process, the findings of the present research revealed how hotels adapt their dynamic capabilities to adjust their technology-based strategy to gain long-term CP (Figure 2). Data analysis of in-depth interviews with hotel managers revealed that all types of hotels are able to apply good sensing capability in recognizing the fast development of technology, sensing increased needs for high technology and observing government requirements and support to fight against COVID-19. According to the information gathered via sensing capability, hoteliers learned that employees are unsatisfactory, whereas SSTs’ advantages stand out amid the pandemic. However, hotels may not buy new SSTs due to depleted financial resources. Nonetheless, a hotel’s IT team and prior technology strategy may moderate the influence. It is recommended that hoteliers evaluate whether their coordinating capability is compatible with their hotel position, culture and prior technological strategy. Hotels are also advised to pay attention to the fit between SSTs and the nature of the tasks in which SSTs are proposed to replace human staff. These findings suggest that the factors influencing hotels’ application of SSTs both before and after the outbreak of COVID-19 are similar.

Equipped with these dynamic capabilities, hoteliers conduct strategy analysis, adjustment and implementation (Figure 2). Data analysis revealed that SSTs are conducive to reducing human-to-human contact, and thus decreasing the risk of COVID-19 infection; improving employees’ well-being and making customers feel fresh, fun and convenient. Nevertheless, the investment cost of SST is high and current technology remains imperfect. Some contactless services are incomplete. The analysis of the pros and cons of SSTs
together with the aforementioned deficiencies in learning and integrating capabilities makes hotels rarely introduce new SSTs. Yet, SSTs introduced before the COVID-19 pandemic were used more frequently and received good customer and employee feedback. These findings provide insights for both academia and industry.

6.2 Theoretical contributions
Unlike recently published studies concentrating on the impacts of and responses to the COVID-19 pandemic, this study uses the SST application as an example to explore how and why hotels formulate and adjust strategies to gain CP in a suddenly changed environment. The findings provide new insights into the literature on technology as a risk-reduction strategy. Notwithstanding previous studies suggesting technological innovation as a risk-reduction strategy (Hao et al., 2020), knowledge about how and when service firms introduce these technologies and their effectiveness is sparse (Kabadayi et al., 2020). Theoretically, we contribute to the literature by revealing the analysis, formulation, evaluation, selection, adjustment, implementation and performance of SST as a recovery strategy according to hotels’ own dynamic capabilities, which are usually not realized by hotel managers. These findings fill the gaps concerning the crisis readiness and the decision-making process involved in technology-based crisis management (Yacoub and ElHajjar, 2021).

In addition, this study proves the usefulness of dynamic capability in explaining technological strategy management in a suddenly disrupted environment and in tourism and hospitality. Prior research on dynamic capability assumed “system stability” wherein environmental changes are rather gradual than disruptive (Colombo et al., 2020). In previous literature, environmental changes usually cover technological turbulence and competitive intensity (Coreynen et al., 2020). Only a few studies have paid attention to the usefulness of dynamic capability when faced with major unanticipated and disruptive changes (e.g. COVID-19 pandemic). The present study offers empirical evidence for the usefulness of dynamic capability in environmental jolts. Few studies within the tourism and hospitality sector address this topic (Leonidou et al., 2015; Nieves et al., 2016). Thus, this study fills the research gap.

Moreover, pinpointing the dynamic capabilities associated with SST adoption is important because they are considered the source for firms to create sustained CP (Baumann et al., 2019; Coreynen et al., 2020). Yet, based on a recent literature review conducted by Buitrago R and Barbosa Camargo (2021), there is no research integrating CP with dynamic capabilities as existing studies have separately focused on the prevalence of one or the other in understanding competitiveness. This is the first time that these separate theoretical approaches have been integrated to understand how the SST-based risk-reduction strategy helps a hotel to gain productivity and competitiveness during the COVID-19 pandemic and in its aftermath. More specifically, this study responds to these concerns by examining SST strategy within different types of hotels, namely, their capability to sense, learn, integrate and coordinate sources for CP. The findings revealed that hotel earnings barely cover their expenses, not to mention introducing new technologies amid the COVID-19, albeit the needs and acceptance of SST have increased in all instances. Similar to previous studies on SST adoption before the COVID-19 pandemic (Liu et al., 2020), the main constraints of SST adoption remain budgetary. That is, regardless of the pandemic, the organizational application of SSTs mainly depends on financial readiness.

Finally, this study combines two separate streams of strategy management literature for the first time: the content of strategic management and the process of how managers formulate and implement strategies. To fully understand hotels’ strategic transition resulting from COVID-19, this study examined the dynamic capabilities necessary to adopt
SSTs and then explored the SST strategy management process. The integrated model of dynamic capability and strategic management process helps tackle the need for long-term development and the necessity of addressing the variability of the environment (Sołoducho-Pelc, 2015). For example, due to the different effects of COVID-19 on hotels’ dynamic capabilities, hotelier #13 from a hotel staffed mostly by SSTs accelerated their application of SSTs in all hotels to gain CP. In contrast, hoteliers from hotels minimally or partially staffed by SSTs postponed their investment in SSTs to survive in the pandemic. Therefore, this study provides new insights into the research on technology-based crisis management by offering constructive and detailed decision practices of the recovery strategy.

6.3 Practical implications
The findings of this study offer valuable practical implications. First, by revealing how COVID-19 changed hotels’ capabilities, this study offers valuable references regarding how hotels respond to the pandemic according to their conditions (Colombo et al., 2020). The identified dynamic capabilities can help managers determine their capacity to purposefully create, integrate, reconfigure and upgrade their resources and capabilities to match market change to attain and sustain competitive advantage in the aftermath of the pandemic. For example, hoteliers have successfully sensed the fast development of technology, increased customer needs and government regulation/support. However, due to financial constraints, the ability of hotels staffed mostly or minimally by SSTs to introduce new technologies was postponed. Alternately, when hotels earn enough profits and have their own IT team, they may consider introducing technological innovations. Therefore, this study helps managers make quick but sound decisions in disrupted environments with the aid of dynamic capabilities.

Our detailed strategic management practices in response to COVID-19 can provide constructive references for current and future crisis management strategies. Figure 2 illustrates that hotels usually need to conduct detailed analysis and evaluation of a strategy.
before making adjustments and implementation. For instance, the results provide constructive and valuable references for industry practitioners in terms of how to configure SST-based contactless services and human services to reduce infection rates, satisfy customer needs, and thus gain long-term CP. This study revealed that customer needs for and satisfaction with contactless services has increased. In this regard, hotels that had purchased SSTs (e.g. robots) can give more delivery tasks to robots. Yet, they were suggested to consider the fit between robots and the nature of tasks assigned. For example, robots are useful during night shifts. As such, hotels need to evaluate and reconfigure their own capabilities and adapt their strategies according to the changes brought by the pandemic.

6.4 Limitations and future research
A couple of limitations of this study, together with suggestions for future research, are discussed. First, although quantitative research is suggested to generalize findings, this research is based on purely in-depth interviews. The qualitative findings lack generalizability possible via quantitative analysis and examination. Thereby, further quantitative research is warranted to unpack the dynamic capabilities of different types of hotels, as well as to examine and compare the technology-induced CP of different types of hotels.

While this study concentrates on hotels within the region of China, cross-contextual and cross-cultural studies would bring new insights. Distinct pandemic responses in different countries have resulted in different outcomes (Shapoval et al., 2021). CP has developed a relationship and analysis structure among culture, competitiveness and performance (Baumann et al., 2019; Buitrago R and Barbosa Camargo, 2021). Adding that dynamic capabilities theory is useful for understanding international competitiveness, it would be interesting to examine SST-based strategy and its performance across cultures. For instance, future research could explore international hotel group’s technology strategies and compare subordinate hotels’ CP among the brand’s properties in different countries.

Moreover, this study focused on the firm level, neglecting the rich data of the interaction between customers and employees. Prior studies have focused on individual dynamic capabilities (Kim and Boo, 2010). Therefore, outlining a multilevel study that is capable of explaining SST application from the perspectives of more stakeholders such as customers, employees, managers and even governments will be of great interest and significance. Additionally, as CP is a three-level model (micro–meso–macro) (Baumann et al., 2019; Hoadley, 2020), it would be of interest to examine the interaction among the micro (individual), meso (firm) and macro (country) levels’ strategy management and the corresponding productivity and competitiveness (Pappas and Glyptou, 2021).

References


**Corresponding author**

Jingjing Yang can be contacted at: yangjingjingtm@126.com

For instructions on how to order reprints of this article, please visit our website: www.emeraldgrouppublishing.com/licensing/reprints.htm

Or contact us for further details: permissions@emeraldinsight.com