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Shaping Social Media Analytics in the Pursuit of Organisational Agility: A Real Options Theory Perspective

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Abstract

Although social media analytics has been extensively adopted by the hotel industry, how hotels leverage social media analytics capability (SMAC) to create business value remains unclear. Underpinned by real options theory (ROT), this study presents a framework to examine the mechanisms by which organisational agility indirectly influences hotel performance through the mediating role of SMAC. We tested the framework by drawing on a dataset of matched data from hotel practitioners and the customer reviews attached to each surveyed hotel on TripAdvisor. Our empirical results confirm that the appropriate deployment of SMAC has the potential to develop positive word-of-mouth and improve customers' perception of hotel quality. More importantly, our findings highlight the important role of SMAC in mediating the effect of sensing agility on hotel performance. However, SMAC cannot mediate the impact of responding agility on hotel performance. This study contributes to hotel management research by emphasising the importance of SMAC and enriches the extant literature on organisational agility in the tourism context.

Keywords: Social media analytics capability; Organisational agility; Real options theory; Hotel performance

1. Introduction

Organisational agility, defined as "an ability to be proactive as well as responsive to changes" (Ketchen and Hult, 2007, p. 574), has been viewed as a critical factor in determining the extent to which a firm achieves superior performance (Bernardes and Hanna, 2009; Goldman et al., 1995). As highlighted in the tourism management literature, organisational agility can help hotel executives to respond promptly to customer demand and rapid market changes (Melián-Alzola et al., 2020). To develop organisational agility, hotels increasingly invest in social media analytics (SMA), which can replace the traditional market survey by providing automatically generated market and customer insights (Gu and Ye, 2014; Cui et al., 2018). SMA is defined as "all activities relating to gathering relevant social media data, analysing that data, and disseminating findings as appropriate to support business activities" (Holsapple et al., 2018, p.33). It has been widely acknowledged as a panacea for businesses that significantly improves customer satisfaction (Gu and Ye, 2014; Sheng et al., 2019; Xiang et al., 2017), and consumers' perceptions of service quality (Brochado et al., 2019; Gao et al., 2015). In practice, however, many hotel practitioners are still unsure how to leverage analytical capability to facilitate social media initiatives and even question whether SMA can bring about the reported benefits (Cohen, 2018).

The current tourism literature has not fully explored what role social media analytics capability (SMAC) could play in building an agile organisation and optimising hotel performance. To address this research gap, it is necessary to conceptualise and empirically test SMAC in the tourism context. In general, SMAC is defined as the ability to analyse social media content in order to create specific customer knowledge and make business decisions (Holsapple et al., 2018). SMAC is particularly important for hotels, as the hotel sector is highly reliant on social media platforms, both externally and internally (Cohen, 2018). Given that the current competition among hotels is dependent on electronic word-of-mouth (WoM) and online reviews generated from customers, SMAC as crucial for facilitating marketing communication (Ghose et al., 2019; Leung et al., 2015), generating innovative ideas and insights from customers (Verma et al., 2012) and making sound decisions (e.g., hotel price and market segmentation) (Holsapple et al., 2018). Therefore, this study intends to answer the research question: *What complex relationships exist between organisational agility, SMAC and hotel performance in the hospitality industry?* To do so, we draw upon the real options theory (ROT) to explain the role of organisational agility in achieving hotel performance with the support of SMAC.

By answering the above research question, this study aims to make three contributions to the tourism and hospitality management literature. First, going beyond the resource-based view (RBV), we highlight the effects of organisational agility on hotel performance from the ROT perspective. We propose that, by investing in the option of agility capability, hotels can gain positive WoM and improve customers' perception towards hotel quality. Second, building upon the business value of information technology (IT) literature, our study empirically examines how SMAC mediates the agility and hotel performance relationship. It should be noted that this line of enquiry is different from traditional IT-agility research demonstrating how IT facilitates organisational agility (e.g., Lee et al., 2015; Lu and Ramamurthy, 2011). Third, we offer practical recommendations regarding the development of organisational agility, aiming to help hotels improve their performance by exercising agility options through the aid of SMA.

The rest of the paper is organised as follows: Section 2 presents the development of the research model with associated hypotheses. Section 3 the research methodology, which includes both data collection and analysis. Section 4 provides the results obtained from the empirical analysis. Section 5 comprises a critical discussion of the research results and theoretical and managerial implications. The paper ends with an acknowledgement of the research limitations and recommendations for future research.

2. Research Model and Hypothesis Development

2.1. *Organisational Agility and Real Options Theory (ROT)*

Organisational agility is rooted in two specific concepts: adaptability and flexibility. According to Christopher and Towill (2001), the nature of organisational agility is closely related to adaptability, while Lee (2004) explicitly distinguishes between adaptability and agility according to the nature of changes and associated response. Similarly, while Teece et al. (2016) argue that organisational agility is "almost a synonym for flexibility" (p. 17), Swafford et al. (2006) view organisational agility and flexibility as distinct concepts in the context of the supply chain. Lu and Ramamurthy (2011) extend the notion of flexibility and identify two forms of organisational agility: market capitalisation agility and operational adjustment agility in the context of information systems.

In general, organisational agility is defined as "an ability to be proactive as well as responsive to changes" (Ketchen and Hult, 2007, p. 574). From a customer-based perspective, Roberts and Grover (2012b) define organisational agility as "the degree to which a firm is able
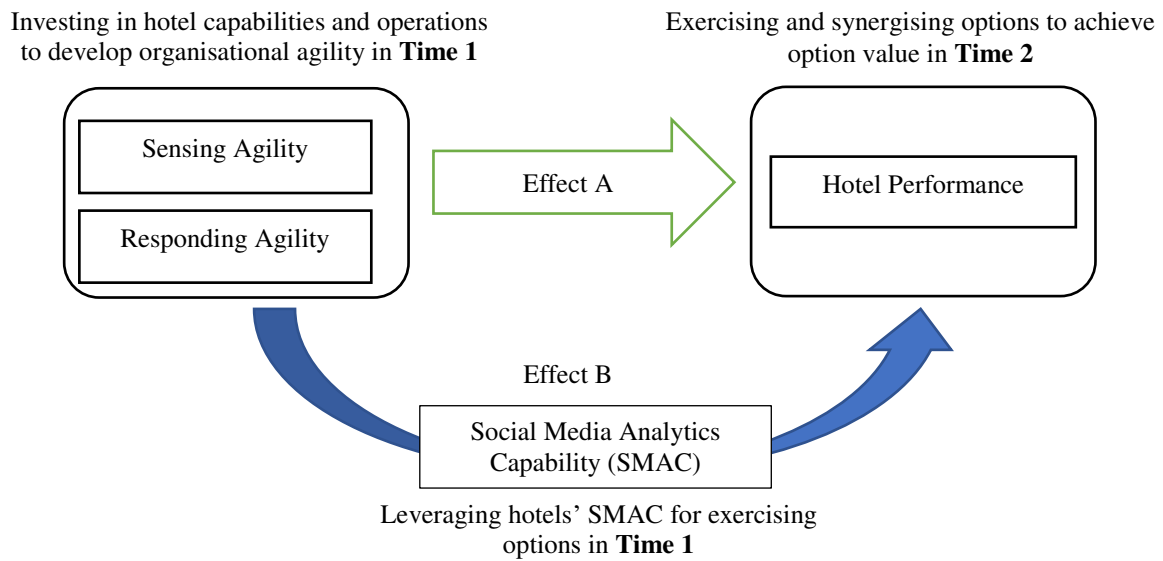
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to sense and respond quickly to customer-based opportunities for innovation and competitive action" (p. 580). Some studies (e.g., Lee et al., 2015; Teece et al., 2016) take a dynamic capability view to define organisational agility as a higher-order organisational capability which supports the organisational strategic tasks of sensing and responding to environmental changes. Organisational agility can also be explained by the information-processing view, which considers agility as a sense and response process of an organisation (Park et al., 2017). In this study, we conceptualise organisational agility as sensing agility and responding agility.

The real option approach is helpful for managers to value effectively those investments that tend to exhibit high uncertainty and irreversibility (Trigeogis, 1993). According to Trigeorgis and Reuer (2017), an option can be defined as "a right, but not an obligation, to take some future specified action at a specified cost. At its core is a fundamental decision asymmetry to take a future decision (e.g., invest) only if it's beneficial to the decision maker, but not otherwise" (p. 43). Although the concept of real option is related to the financial option (Myers, 1977), there is a difference in that real options usually involve 'real' underlying assets. Whereas the financial option gives investors the right to act to acquire a financial security, where the underlying asset would be, for example, shares of stock, in the case of the real option the underlying asset could be the product developed from an R&D program or the cash flows that are tied to an information systems investment. Therefore, the development of ROT is based on the extension of the options thinking from a financial product or service to tangible or intangible 'real' assets. Extending from the findings in finance research, ROT can be described as a mechanism that is used to assess the value of technological investment or firm's capability building (Kogut and Kulatilaka, 1994; Fichman, 2004). For example, real options such as developing relationship flexibility or operational flexibility (Lee et al., 2020), digital options (Sambamurthy et al., 2003), and cooperation versus competition in firms' strategic decisions (Trigeorgis and Reuer, 2017) are seen as "the opportunity without an obligation to take some action in the future in response to endogenous or exogenous developments" (Tiwana et al., 2007, p. 159).

From the perspective of ROT, it is suggested that decision makers should be more proactive in responding to uncertainty. Unlike the traditional RBV, which sees competitive advantages as being obtained from the heterogeneity in organisational resources, ROT views firms' investment opportunities and firm-specific knowledge as the main drivers to achieve competitive advantage in a dynamic environment (Trigeorgis and Reuer, 2017). That is, investing in the options that suit the company can help it to perform strategic actions and, thus, achieve competitive advantage at the right time. In this study, we leverage ROT to

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conceptualise two types of agility, sensing agility and responding agility, as option investments, suggesting their effects on hotel performance. Organisational agility is developed over time by dynamically allocating the available resources, process and structure within a company, rather than directly obtained from the market or gained without organisational learning (Makadok, 2001). Hence, developing organisational agility is a kind of investment for exploring and identifying options in the market, and it creates opportunities to expand and grow in the future (Trigeorgis and Reuer, 2017). Organisational agility is crucial to a company's ability to sense and respond to the changing environment (Roberts and Grover, 2012b). Sensing agility and responding agility are different, but aligned (Kalaignanam et al., 2021). They represent real options that can sustain competitive advantage (Barney, 1991; Roberts and Grover, 2012a; Tse et al., 2016).

With regard to the hotel industry, executives would view investment in sensing agility real options as a vehicle for creating new opportunities (Teece, 2007). On the other hand, they would consider investing in responding agility real options as a way of reacting to the changing conditions driven by customers (Cho et al., 1996; Roberts and Grover, 2012a; Park et al., 2017). Taken together, sensing and responding agility are important enablers of hotel performance (Effect A in Figure 1). ROT further contends that a firm identifying real options needs the support of management systems, especially the ability to process massive information, to execute selected options effectively (Kogut and Kulatilaka, 1994; Lee et al., 2020). In this regard, SMAC can be viewed as a specific information processing capability that bridges the options identified by organisational agility and return of options (i.e., hotel performance) (Effect B in Figure 1). We argue that agility guides hotels in the implementation of appropriate social media analytics (SMA), hence towards achieving true competitive advantage. Different types of organisational agility and SMAC would lead to different types of competitive advantage.

Investing in hotel capabilities and operations to develop organisational agility in **Time 1**

Exercising and synergising options to achieve option value in **Time 2**

Sensing Agility

Responding Agility

Effect A

Hotel Performance

Effect B

Social Media Analytics Capability (SMAC)

Leveraging hotels' SMAC for exercising options in **Time 1**

Figure 1. Research model that builds on the real option theory

2.2. *The Relationship Between SMAC and Hotel Performance*

SMA is defined as "all activities relating to gathering relevant social media data, analysing that data, and disseminating findings as appropriate to support business activities" (Holsapple et al., 2018, p.33). Xiang et al. (2017) regard SMA as an analytical tool that utilises social media data to explore customers' insights and potential demands, while Fan and Gordon (2014) view SMA as an IT capability and conceptualise it into three components based on its functionalities: (1) data aggregation; (2) data analysis; and (3) data interpretation. Data aggregation capability refers to the firms' ability to collect structured data and user-generated content from social media platforms and to transform them into a unified data structure for further analysis (Dong and Wu, 2015). It is used to gather an extensive volume of customer feedback on social media. Focusing on the utilisation of different analytical approaches, data analysis capability refers to the organisational capability to address various customer needs for specific application goals. It can be viewed as a crucial component of SMAC that transforms social media data into useful insights. At a more advanced level of data usage, data interpretation capability refers to the firm's ability to interpret data from the business reports created by SMAC (e.g., social media traffic metrics and visual dashboards/systems).

According to ROT, the synergy effect generated by the externally acquired capacities and firm's internally existing resources will affect the return of real options (Lee et al., 2020). Thus, in the context of tourism and hotel management, the externally captured feedback from social media communities may complement the hotel's capabilities to increase the return of

real options. Following this line of argument, we can expect the investment in SMAC to facilitate the timely acquisition of customer feedback from social media so as to inform decisions relating to the customer experience and service quality improvement (Moe and Schweidel, 2017). In addition, Wang et al. (2019) argue that firms with high levels of SMAC can complement their traditional decision-making process by formulating actionable decisions to address consumers' needs. For instance, using multi-channel analytics to analyse social media platforms' traffic data, the Intercontinental Hotels Group (IHG) is able to scan, learn and interpret new opportunities (e.g., changing customer preferences) by overseeing the corporate dashboards and metrics (e.g., conversion rate and clicks) and linking these to deliver customer engagement and improve customer perception toward hotel service quality (Bredava, 2018; Woollacott, 2016;). As it is acknowledged that SMAC enables firms to acquire customer insights effectively, thus allowing those firms to improve customer experience (Moe and Schweidel, 2017; Toubia et al., 2019), we further argue that SMAC can be deployed to improve customers' perception of hotel quality.

With regard to management of word-of-mouth, Luo et al. (2013) emphasise that firms are able to oversee consumers' feedback on products and services through gathering relevant social media data (e.g., consumers' experiences, social networks, preferences, and options), and that this can inform their proactive business decisions. For example, because social tags can reveal useful market information and customer insights, tracking social tags on social networking sites enables firms to better manage brand equity (Nam and Kannan, 2014). Recent studies also suggest that the adoption of advanced analytics algorithms for analysing the collected data from online travel agents' websites (e.g., TripAdvisor, Kayak, and LateRooms) or other social media platforms can help to craft customer engagement initiatives, which, in turn, improve hotels' word-of-mouth (Cohen, 2018; Liu and Toubia, 2018; Toubia et al., 2019). For instance, using latent Dirichlet allocation to extract and analyse the product features, Toubia et al. (2019) improve the prediction of consumers' behaviour and preferences. We argue that hotels with a high level of SMAC can aggregate, analyse and interpret user-generated content from multiple sources, such as their own social media accounts or online travel agencies' websites, thereby effectively improving their word-of-mouth. Therefore, the following hypotheses are proposed:

Hypothesis 1 (H1): Social media analytics capability has a positive effect on word-of-mouth.
Hypothesis 2 (H2): Social media analytics capability has a positive effect on perceived quality.

2.3.   The Relationship Between Organisational Agility and SMAC

From the perspective of ROT, both sensing and responding agility can be seen as the capability to identify the operational and marketing options to invest (Lee et al., 2020). Given the rapid evolution of current social media platforms in terms of their functions (e.g., the recently launched invite only audio chat app Clubhouse) and ways to engage social discussion (e.g., live streaming broadcasting), the efficient development of SMAC requires firms to identify and respond to market demands promptly, and even to predict technology trends (Li and Law, 2020). As organisational agility enables firms to respond to market changes with speed and dexterity, the options it may help to identify or create may include expanding the social media communication scale when new apps are introduced, or extending the usage of a particular social media platform. At the same time, a portfolio that includes different, complementary, options, might further enhance the SMAC with greater flexibility.

As argued by Chau and Tam (1997), implementing IT requires technological, organisational, and environmental preconditions to be fully considered. Most importantly, organisational preconditions such as organisational resources, capabilities, and strategies determine the efficiency of IT use. The volatility of social media data implies that its real-time nature may ultimately generate invalid predictions or questionable decisions (Moe and Schweidel, 2017). Therefore, to harness the volatility of data and exercise the options that emerge from social media effectively, organisations must have the ability to sense and respond to the changing data environments of a dynamic business.

In addition, we argue that organisational agility can serve as a prerequisite of SMAC because of the information value chain. More specifically, the value of information greatly relies on how users (e.g., managers and executives and data analysts) can leverage information for strategic planning (Abbasi et al., 2016). Achieving successful SMA requires human involvement to oversee how social media data is processed across all stages of the information value chain, and human judgement on the outputs of SMA can bring novel insights (Raman, 2016). Business is not always predictable, due to the high speed and variety of digital transformation (Wei et al. 2014), and when individuals or organisations have the ability to scan new opportunities and react to the changing market conditions in an agile manner, they will be better able to perform SMA tasks. Organisational strategic resource and capability are necessary when executing organisational tasks (e.g., searching for new opportunities on the markets). We argue that firms with higher organisational agility (considered as organisational

capability) have better opportunity to orchestrate aggregation, analysis and interpretation of SMA. Therefore, we hypothesise:

Hypothesis 3 (H3): Sensing agility has a positive effect on social media analytics capability.

Hypothesis 4 (H4): Responding agility has a positive effect on social media analytics capability.

2.4.   The Mediating Role of SMAC in the Organisational Agility-Hotel Performance Link

In the context of the tourism and hospitality industry, the existing literature has widely acknowledged the important role of organisational agility in improving tourists' satisfaction (Melián-Alzola et al., 2020) and resisting market uncertainty (Darvishmotevali et al., 2020). From the perspective of ROT, organisational agility can improve performance by expanding firms' aggressive actions and market-response options (Tallon and Pinsonneault, 2011; Sambamurthy et al., 2003; Roberts and Grover, 2012b). These actions and options can not only help companies control market risk and uncertainty, but also create opportunities for future benefit in the form of profitability or cost reduction (Benaroch et al., 2006). At the same time, due to the great potential of user generated content (UGC) data to understand tourist behaviour and offer tourism recommendation (Li et al., 2018), there is an emerging area of discussion on how to establish SMAC in tourism research (Darvishmotevali et al., 2020; Kim and Chae, 2018; Leung et al., 2017; Zavattaro et al., 2015). Nevertheless, the tendency to separate the issue of organisational agility from SMAC in explaining hotel performance improvement is unfortunate.

To contribute to the prior tourism literature and close the research gap, we posit that, by facilitating real time information sharing and rapid stakeholder engagement, SMAC can help to enhance the efficiency of the sense-response process. According to the fundamental assumption of "organisations as open social systems that must process information" (Daft and Lengel, 1986, p. 555), the sense-response process within organisations that aim to generate competitive actions and market-response options relies on organisational and environmental characteristics. This implies that the sense-response process must involve coordination and information sharing between internal and external stakeholders. For example, equipped with strong SMAC, hotel managers are able to monitor the metrics of diverse social media channels (e.g., the review platforms of online travel agencies and general social media platforms) to gauge customer information and provide an appropriate assessment of the service quality (Li et al., 2018). Therefore, the mediation effect of SMAC in the relationship between organisational agility and hotel performance can be explained by the SMAC-aided orchestration of a vast array of competitive actions and market-response options.

In today's business practice, one potential risk is that of focusing solely on the development of organisational agility without considering SMAC; in fact, business decision-makers need to be equipped with customer knowledge generated from social media, which they can respond to instantaneously (Roberts and Piller, 2016). Importantly, most of the impact of organisational agility on hotel performance is due to the strategic tasks and activities of the firm that will allow it to use social media in a meaningful and effective way (Luo et al., 2013). Therefore, firms can enhance their chances of exploiting the unique benefits of organisational agility when they develop SMAC in effectively aggregating, analysing and interpreting social media data to create business value.

Accordingly, through the appropriate deployment of SMAC firms are better able to sense and react to changes in market demand and customer preference, hence ultimately to produce higher profit and improved market share. Specifically, we argue that SMAC serves as a complement to sensing and responding agility in creating hotel performance. Obtaining agility to enhance hotel performance cannot be guaranteed unless organisations have sufficient actions to identify, absorb, transform and exploit the market insights that are generated from social media data. On the other hand, failure of SMAC reduces the odds of exploiting market opportunities and capturing the unique market growth these can generate. Therefore, we hypothesise:

Hypothesis 5a (H5a): Social media analytics capability mediates the effect of sensing agility on word-of-mouth.

Hypothesis 5b (H5b): Social media analytics capability mediates the effect of sensing agility on perceived quality.

Hypothesis 5c (H5c): Social media analytics capability mediates the effect of responding agility on word-of-mouth.

Hypothesis 5d (H5d): Social media analytics capability mediates the effect of responding agility on perceived quality.

3. Methods

3.1. Sampling

The variables in our research model comprise two groups: hotel managers and customers. Data was collected in two steps. First, we recruited managers in charge of overseeing hotel management from hotels in the Attica Region of Greece. We used qualification questions to ensure that these key respondents were C-level executives who had sufficient knowledge of

hotel service management and social media marketing. More specifically, the samples retained for further analysis were managers with at least 2 years' experience in hotel management and social media experience; 70% of these respondents had over 5 years' experience. The contact information of our respondents was obtained from the website of the Hellenic Chamber of Hotels (HCH), a reputable institutional consultant of the Greek government regarding tourism and hospitability issues that has operated since 1935. Since the hotels listed by the HCH are all officially registered, we considered this list as representative in our research context of Greece. Initially, we identified 648 hotels from the list. The hotel information was manually captured from the website by a research assistant and then cross checked by the authors to ensure data consistency. After cleaning up the duplicated, missing or incorrect contacts, 550 hotels were usable. We contacted the respondents by phone and email in June and July 2016 and asked them to provide opinions regarding their perceived organisational agility and the development of SMAC. In many cases, we arranged face-to-face visits to encourage them to participate. These efforts yielded 158 responses out of 550 questionnaires sent out, a response rate of 28.73%. The sample size (n=141) of this study is relatively small in comparison with the traditional cross-sectional based SEM study, but we are confident our sample has sufficient statistical power to demystify the model. According to the sample size rules of thumb given by Jackson (2003) and Takeuchi et al. (2002), the ratio of respondents to parameters estimated should be at least 5:1 to meet the minimum sample size requirement. Our effective sample size to parameter ratio of 9.4:1 (=141 responses/15 measurement items) exceeds the suggested minimum of 5:1 for reliable maximum likelihood estimation.

In the second step of data collection, the hotel performance data of the 158 hotels was captured from TripAdvisor, which is widely acknowledged as a reliable source. Customer review data was collected within a one-year time frame (August 2017 to the end of July 2018). Our final effective dataset includes matched data from 141 hotels and 12,549 customer reviews extracted from TripAdvisor. For the other 17 hotels, we were unable to obtain customer review data from TripAdvisor.

Among our effective surveyed hotels, 83.7% had more than 40 employees. In terms of hotel capacity, 26.2% owned fewer than 20 rooms, 10.6% 21-40 rooms, 12.8% 41-60 rooms, 28.4% 61-80 rooms, 17.7% 81-100 rooms, and 4.3% had more than 100 rooms. Regarding hotel star ratings, 6.4% of hotels in our sample were classified as 1 tar, 19.1% as 2 star, 30.5% as 3 star, 30.5% as 4 star, and 13.5% had a 5-star rating. In terms of geographical location, 66.7% of the hotels were located in metropolitan areas and 33.3% in rural areas. As for hotel type, 75.9% were classified as independent and 24.1% as international chain hotels.

To test the non-response bias, we performed a chi-square (χ^2) test between the early-response group (n=64) and late-response group (n=77) in terms of hotel capacity (χ^2=3.27, df=5, p=0.659) and number of reviews (χ^2=90.11, df =81, p=0.229). The results indicate that non-response bias is not a threat to our research, as the results of both χ^2 tests are insignificant at the level of 0.1.

3.2. Measurements

The original question items for measuring the proposed constructs were developed in English. As our targeted respondents were practitioners in the hotel industry in Greece, to improve the response rate we translated all the question items from English into Greek. Following the existing literature, in order to ensure the accuracy of translation a back translation approach was applied (Brislin, 1970), using a two-step process. In the first step, the author prepared a Greek version of the questionnaire for review by two independent experts. In the second step, the first expert was asked to review and translate the second half of the original questionnaire into Greek and the first half of the Greek questionnaire into English. For the second expert, the task order was reversed. A panel meeting was hosted by the author with the two independent experts to check the consistency between the prior-translated version and the expert-translated version. This allowed the identification of confusing translated questions that might yield discrepant responses, which were then dropped from the final version of the questionnaire.

Tables 1 and 2 present the descriptive statistics and question items for all the observed constructs. Respondents were asked to assess all the questionnaire items through a 5-point Likert scale, from strongly disagree=1 to strongly agree=5. Six existing scales from Wang and Byrd (2017) were directly adopted as the proxies of SMAC. We adopted four items of sensing agility and five items of responding agility from Roberts and Grover (2012a).

The firm's hotel performance, measured by word-of-mouth and perceived quality, was observed as our key dependent variable. In social media environments, word-of-mouth is often generated by online users disseminating positive or negative opinions toward the firm and its service/product (Chen et al., 2011; Wang and Yu, 2017). Understanding public word-of-mouth towards brands or products is crucial for firms. Positive word-of-mouth shared by consumers emphasises the advantages and strengths of a service/product, while negative word-of-mouth disseminates potential concerns and weaknesses of a service/product. In the marketing literature, it has been viewed as one of the customer post-purchase behaviours in the consumer decision process and used to assess performance outcomes of firms' marketing strategies and actions (Katsikeas et al., 2016). In this study, we applied a lexicon-based analysis to capture

the sentiment value of the customer comments toward the hotel as a proxy of online word-of-mouth (Ma et al., 2018). The word bank developed by Hu and Liu (2004) was applied in our sentiment analysis to decide the polarity. To ensure the consistency of data across all the observed hotels, we collected customer review comments from TripAdvisor for the period (August 2017 to end of July 2018), as we needed to create a one-year time lag between independent variables and dependent variables.

Perceived quality is defined as "a consumer's appraisal of a product's overall excellence or superiority" (Gotlieb et al., 1994, p. 875). Katsikeas et al. (2016) classify it as market performance from the consumer mindset perspective that assesses customer attitudes toward the firm and its service/product. Perceived quality is a strong predictor of consumers' behavioural intention and has been widely used in the tourism literature to evaluate the performance of tourism-related experiences (Ganzaroli et al., 2017; Rezaei et al., 2018). We followed Ganzaroli et al. (2017) to operationalise the perceived quality of a hotel, which is a latent variable involving the *expected goodness* (GDN) and the *concentration ratio* (CNC) of five rating levels given by the customer on TripAdvisor. We computed the above-mentioned factors as follows:

$$[1]\ GDN = (EXC + GOOD)/PPT$$

$$[2]\ CNC = 1 - [1 - (\sum_{i=1}^{k} p_i^2) * \frac{k}{k-1}]$$

Where PPT is the number of English reviews received by a hotel, EXC and GOOD are the percentage of "excellent" and "very good" judgements. The CNC is measured as the inverse of the Gini index (Ganzaroli *et al.*, 2017), where *p* represents the percentage of the *i* rating level from 1 to 5 (*i*=1…k). The data points we captured from TripAdvisor are presented in Figure 2.
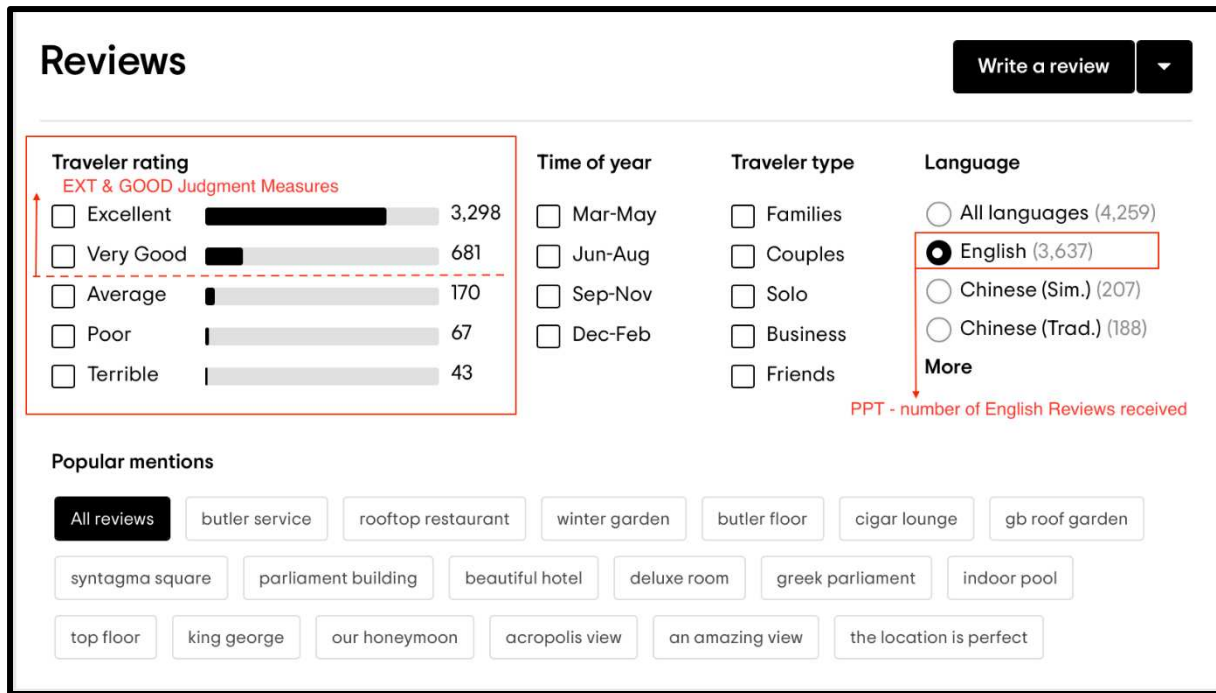
Note: screen capture from the TripAdvisor page for the Hotel Grande Bretagne[1]

Figure 2. Data points of measuring perceived quality captured from TripAdvisor

In addition, five control variables that might be associated with the dependent variables were considered in our study, namely organisational size, hotel capacity, star ratings, geographical location and hotel type. First, following the existing studies, we took the number of employees and the number of rooms as the indicators of organisational size and hotel capacity respectively (Hwang and Chang, 2003; Madanoglu and Ozdemir, 2016). We manually collected all the relevant information from the Hellenic Chamber of Hotels website. Second, the widely accepted five-star rating approach was applied to categorise the hotel quality (Sparks and Browning, 2011). Third, for the geographical location, we used a dummy variable to classify the hotels into two groups, namely metropolitan (e.g., the city of Athens) and rural area (Yang et al., 2014). Finally, according to Banerjee and Chua (2016), the difference in governance structure of hotels may result in diverse organisational capabilities. Therefore, we also controlled the impact of hotel type (i.e. chain hotel vs. independent hotel) on the hotel performance.

According to Podsakoff and Organ (1986), when the data for dependent and independent variables are collected from a single informant, common method variance (CMV) could be a threat to the empirical study. To circumvent the risk of CMV, the data for the independent

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[1]The webpage - https://www.tripadvisor.com/Hotel_Review-g189400-d198715-Reviews-Hotel_Grande_Bretagne_A_Luxury_Collection_Hotel-Athens_Attica.html was accessed on 18 Feb 2021.

variables are taken from the questionnaire, while the data for dependent variables are collected from online review platforms. In this way, by using both primary data and archival data, the threat of CMV should be reduced (Podsakoff and Organ, 1986). In addition, using the prior method to control the common method bias, we estimated the method variance at the item level through the use of unmeasured method factor (Hulland et al., 2018). Specifically, we examined two CFA models: in addition to the original CFA model structure, we added a common latent factor in the second CFA model to examine the common method variance. The results indicate that the significance level of all the factor loadings and model fit indices are largely the same for the two CFA models. To further examine the CMV issue, we followed the approach of Malhotra et al. (2006), which suggests the use of a variable that is theoretically unrelated to at least one variable in the model as a marker variable. In this research, we used gender as a marker variable; it is not related to any of the proposed constructs, as is also statistically confirmed in the respondent check we addressed in the above analysis. As expected, we received insignificant correlations between the proposed constructs and the marker variable. Following Lindell and Whitney (2001), we captured the adjusted correlation for all the constructs through the value of 0.035, as it is the lowest positive correlation of the marker variable (i.e., gender) with other observed constructs. We found that CMV would not be a significant problem for this study, as the significance levels of all the correlation estimates remain the same after adjustment from the inclusion of the marker variable.

Table 1. Descriptive Statistics and Correlations among Observed Constructs

Variable	Mean	S.D.	Composite reliability	AVE	1.	2.	3.	4.	5.
1. SMAC	2.582	0.923	0.882	0.556	**0.746**				
2. Sensing Agility	4.094	0.564	0.848	0.582	0.366**	**0.763**			
3. Responding Agility	4.114	0.593	0.878	0.592	0.332**	0.301**	**0.770**		
4. Perceived Quality	0.5942	0.196	-	-	0.324**	0.131	0.041	-	
5. Word-of-mouth	2.4879	0.682	-	-	0.274**	0.204**	0.085	0.665**	-

Notes: **$p<0.01$; The lower triangle of the matrix displays the correlations among the proposed factors and the square root of average variance extracted (AVE) of each latent construct is shown on the diagonal.

3.3. Data Analysis

In the data analysis we used SentiStrength for the lexicon-based sentiment analysis and IBM SPSS Amos 26 for testing hypotheses. As the basic assumptions (such as a relatively large sample size, normality of distribution, a less complex model structure, and moderate number

of indicators for the latent constructs) were satisfied, we selected CB-SEM as our analysis approach to test the theoretical model in order to obtain more precise results with the maximum likelihood estimation (Peng and Lai, 2012; Mikulić and Ryan, 2018). The CB-SEM analysis comprises two steps (Anderson and Gerbing, 1988). First, the latent constructs are validated through a measurement model with confirmatory factor analysis (CFA). If the criteria of the CFA model fit indices are met, the proposed causal model analysis is then performed using the Amos program with structural model fit assessment (Gefen et al., 2000).

4. Results

4.1. Measures Validation: Goodness of Fit, Reliability and Validity

Normality of data was checked using Skewness and Kurtosis measures. The results [±3] showed that data was normally distributed (Table A1, appendix A). As presented in Table 1, the composite reliability (p_r) of three latent variables, which exceed the minimum recommended value of 0.7 (Han et al., 2018), confirm the construct reliability.

To assess the fit between the collected data and proposed constructs, confirmatory factor analysis (CFA) was performed for 3 latent factors and 16 items (see Table 2 for the list of all measurement items). The results obtained from the CFA support the overall data validity. Initially, convergent validity was confirmed, as the factor loadings range from 0.663 to 0.897, all of which are highly significant and exceed the benchmark value (Anderson and Gerbing, 1988). The average variance extracted (AVE) are all above the rules of thumb of 50%, where the smallest number is 0.556 for SMAC. In addition, assessing the discriminant validity is vital to validate the construct structure (Olya, 2020). In this study, we used the comparison between the correlation coefficient and square root of AVEs. As all the inter-construct correlations are found to be smaller than the corresponding square root of AVE, it appears that discriminant validity is confirmed (Fornell and Larcker, 1981). Finally, a good model fit of the CFA model indicates convergent validity for this study. More specifically, the comparative fit index (CFI) with 0.946, the incremental fit index (IFI) with 0.947 and Tucker-Lewis index (TLI) with 0.933 are all above the recommend value of 0.900 as per Hair et al. (2010). At the same time, the root mean squared error of approximation (RMSEA) is 0.072, which is below the cut-off value of 0.08 (Hair et al., 2010). The norm chi-square with $X^2/df=2.360$ is also below the threshold of 5.

Table 2. Measures, CFA factor loadings, and reliability

Variables	Standard factor loadings
Social Media Analytics Capability (α=.884) (Wang & Byrd, 2017)	
Collect data (e.g., customer reviews) from social networking sites or travel websites.	0.741
Store data collected from social media in appropriate databases.	0.716
Identify important business insights to improve services.	0.748
Analyse social media data to understand current trends from a large population.	0.701
Provide systemic and comprehensive reporting to help recognise feasible opportunities for service improvement.	0.773
Provide near-real time or real time information on day-to-day hotel services.	0.807
Sensing Agility (α=.846) (Roberts & Grover, 2012a)	
Our hotel continuously tries to discover additional needs of our customers of which they are unaware.	0.713
Our hotel extrapolates key trends to gain insight into what customers in a current market will need in the future.	0.800
Our hotel continuously tries to anticipate our customers' needs, even before they are aware of them.	0.775
Our hotel attempts to develop new ways of looking at customers and their needs.	0.761
Responding Agility (α=.876) (Roberts & Grover, 2012a)	
Our hotel responds rapidly if queries or complaints happen with regard to our customers.	0.814
Our hotel quickly implements our planned activities with regard to customers.	0.663
Our hotel quickly reacts to fundamental changes with regard to our customers.	0.897
When our hotel identifies a new customer need, we are quick to respond to it.	0.727
Our hotel is fast to respond to changes in our customers' product or service needs.	0.728

Model Fit Indices: *Chi-square (df)=205.392 (87), CFI=0.946, IFI=0.947, TLI=0.933, RMSEA=0.072*

4.2. Hypothesis Testing

The hypothesised relationships were tested in a single structural model using maximum likelihood estimation. As shown in Figure 1, the model fit indices of our structural model, i.e. Chi-square (df) = 362.435 (217), IFI = 0.907, TLI = 0.890, CFI = 0.905, RMSEA = 0.069, indicate a good fit. Five variables that potentially impact on the hotel performance were controlled in our model, namely hotel capacity (number of rooms), number of employees, hotel star rating, geographical location (metropolitan vs. rural area) and hotel type (independent vs. chain hotel) (Banerjee and Chua, 2016; Hwang and Chang, 2003; Madanoglu and Ozdemir, 2016; Sparks and Browning, 2011). While geographical location did show an impact (word-of-mouth: β=0.354, p<0.001; perceived quality: β=0.351, p<0.001), the remaining four control variables did not significantly impact on either word-of-mouth or perceived quality. Our result supports both H1 and H2, i.e. SMAC is positively associated with word-of-mouth (β=0.421, p<0.001) and perceived quality (β=0.498, p<0.001). With respect to the antecedents of the SMAC, the results demonstrate positive impacts of sensing agility (β=0.400, p<0.001) and responding agility (β=0.246, p<0.001) on SMAC, thus supporting H3 and H4.

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β for *direct SA->WOM*=0.416***
β for *direct SA->PQ*=0.313***

β for mediation effects of SMAC:
H5a=0.296***
H5b=0.138 (*n.s.*)

Sensing Agility (T1)

Organisational Agility

β for *H3*=0.400***

Responding Agility (T1)

β for *H4*=0.246***

Social Media Analytics Capability (SMAC) (T1)

β for *H1*=0.421***

β for *H2*=0.498***

Word-of-Mouth (T2)

Hotel Performance

Perceived Quality (T2)

β for mediation effects of SMAC:
H5c=-0.102 (*n.s.*)
H5d=-0.081 (*n.s.*)

β for *direct RA->WOM*=0.008 (*n.s.*)
β for *direct RA->PQ*=-0.059 (*n.s.*)

Note: Dotted line indicates the mediating effect of social media analytics capability.
*** path is significant at 0.001; ** significant at 0.01; n.s. means the impact is not significant.
T1: Hotel manager data collected between June and July 2016
T2: Consumer reviews collected within a one-year time frame (August 2017 to the end of July, 2018)
Control Variables: organisational size, hotel capacity, star ratings, geographical location and hotel type.

Figure 3. Results of the structural model

In the hypothesised model, we also proposed that the SMAC mediates the relationship between organisational agility and hotel performance. Our results indicate that the strength of the path coefficient (β) for the direct effects of sensing agility on word-of-mouth (β=0.416, $p<0.001$) and perceived quality (β=0.313, $p<0.001$) are significant, but turn out to be weaker for word-of-mouth (β=0.296, $p<0.001$) and insignificant for perceived quality (β=0.138, *n.s.*) when considering the mediator of SMAC. The results indicate that SMAC partially mediates the relationship between sensing agility and word-of-mouth, and fully mediates the relationship with perceived quality (Baron and Kenny, 1986; Rungtusanatham et al., 2014). In order to measure the strength of the mediation paths, we used the bootstrapping method to further analyse the mediation processes (Saldanha et al., 2013). More specifically, we applied the procedure of 95 percentile bias-corrected confidence intervals with 1,000 samples (Wei et al., 2014). As shown in Table 3, the indirect effect of sensing agility through SMAC was stronger on perceived quality (β=0.190, $p<0.01$) than on word-of-mouth (β=0.113, $p<0.05$). However, both H5c and H5d were not supported by our results, as the direct effects and indirect effects of responding agility on word-of-mouth and perceived quality were not significant.

Table 3. Mediation relationships

Mediation relationship (x→y→z)	Direct effect of x → z without mediator of SMAC	Direct effect of x→z with mediator of SMAC	Indirect effect of x→y→z (bootstrapped-bias-corrected percentile method)
H5a: SA→SMAC→WOM	0.416***	0.296**	0.113*
H5b: SA→SMAC→PQ	0.313**	0.138 (*n.s.*)	0.190**
H5c: RA→SMAC→WOM	0.008 (*n.s.*)	-0.102 (*n.s.*)	0.093 (*n.s.*)
H5d: RA→SMAC→PQ	0.059 (*n.s.*)	-0.081 (*n.s.*)	0.051 (*n.s.*)

Notes: *p*<0.05; **p*<0.01; ***p*<0.001

5. Discussions and Conclusion

In this research, through the lens of ROT, we observed the relationships between organisational agility and hotel performance with consideration of the mediating effect of SMAC. A mixed data source sample comprising questionnaire data collected from hotel managers and customer review data captured from online review platforms was constructed to test the theoretical model. The empirical findings are mostly consistent with our theoretical assumptions and with the existing findings from previous research that SMAC is positively associated with hotel performance. While there is a long tradition of researching SMAC and organisational agility in the context of tourism and hospitability, most of the current studies observe these two key concepts separately. The current study seeks to fill this gap to obtain a more comprehensive understanding of the mechanism behind organisational agility and SMAC so as to make both theoretical and managerial contributions to the relevant context.

5.1. Theoretical Implications

This study provides novel insights by examining the antecedents and consequences of SMA efforts in the hotel industry. First, within the field of hotel management, discussions on how to analyse social media data for the improvement of service operations and business decision support are increasing (e.g., Sheng et al., 2021; Ye et al., 2020). The construct of SMAC has contributed to a deeper understanding of the key aspects for firms initiating efforts in SMA. Prior research has sought to measure the effect of SMA by modelling it as analytical tools, rather than focusing on its practices of data analytics process (Fan and Gordon, 2014). However, such approaches may not be able to provide insights of how SMA can be deployed within a hotel. This study treats SMAC as an analytics capability that aims to guide how SMA is implemented strategically in the real world. Drawing on the ROT, we explore how SMAC can be leveraged by hotels to help managers execute real options of agility for improving hotel

performance. Using the real options theory, Lee et al. (2020) argue that operational flexibility and relationship flexibility enable firms to hold real options for coping with the uncertainty. Our findings extend the literature by showing that developing sensing agility can also be viewed as a valid investment option that helps firms to leverage the opportunities in the market to gain positive word-of-mouth and improve customer perceptions towards service quality. Moreover, our results indicate that SMAC helps hoteliers to predict customer demands and transform customer feedback into business insights and decisions.

Second, this study represents one of the first efforts to examine the relationship between agility and SMAC. The results demonstrate that organisational agility plays a vital role in deploying SMAC. Our finding shows the facilitative role that sensing and responding agility play in developing SMAC, with traditional IT-agility research rather focusing on the impact of IT, showing how the latter improves organisational agility (e.g., Melián-Alzola et al., 2020; Lee et al., 2020; Lu and Ramamurthy, 2011). Within the context of SMA adoption in the hotel industry, we contribute to this strand of the literature through our novel finding that agile firms that are proactive and responsive to frequent changes in competition, technology, and regulations hold the advantage in the development of SMA.

Third, this study challenges the assumption in the current literature that study of the well-known positive linkage between organisational agility and performance may ignore the mediating role of IT capability in social media context. This proposition is supported by our finding of a decisive mediating role of SMAC in the agility-hotel performance link, which suggests that the impact of sensing agility on hotel performance is mediated by SMAC. However, the deployment of SMAC cannot mediate the impact of responding agility on hotel performance. The insignificant result in this regard might be the result of some challenges associated with SMA. For instance, the diversity of social media data could challenge the integration of business processes (Netzer et al., 2012), while the complexity of such data may jeopardise firms' ability to exploit consumer perceptions (Cohen, 2018). Another challenge of implementing SMAC to derive customer insights is that social media data normally suffer from veracity issues. Poor quality social media data may impede managers' ability to make sound data-driven responses to their customers (Moe and Schweidel, 2017). Faced with these challenges, hotels managers may not be able to respond effectively to market opportunities and customer needs to improve their service operations through making efforts to develop SMAC.

Through the lens of ROT, we verify that hotels' ability to translate organisational agility into superior hotel performance is dependent on the indirect effect of SMAC. We focus on clarifying how and why SMA matters when hotels develop their organisational agility for

achieving hotel performance by showing its mediating role. Previous research has assumed the contribution of sensing and responding agility to improving hotel performance (e.g., Kale et al., 2019); however, the existing social media research in the hospitality management context may lack comprehensiveness. Although organisational agility is widely regarded as a significant driver of hotel performance, this study cultivates a more nuanced understanding of the mechanisms whereby organisational agility through SMAC affects hotel performance.

5.2. Managerial Implications

This study offers useful insights to hotel managers with responsibility for SMA implementation to embrace the full value of SMA. Our results show that SMAC is a crucial IT capability that directly impacts hotel performance. We identify data aggregation, data analysis and data interpretation as the key components of SMAC that can be used to evaluate the effectiveness of SMA deployment. With these SMA capabilities, hotel managers can optimise their social media marketing campaigns by exercising SMA initiatives. Aggregation capability allows hotels to collect meaningful customer reviews from various social media platforms and online travel agency websites, analysis emphasises the use of appropriate algorithms and approaches (e.g., descriptive, predictive, prescriptive analytics and recent developments in cognitive analytics) for different data formats.

Moreover, analysing online customer reviews enables firms to optimise price-promotion strategies (Wu et al., 2021), identify key competitors and market preferences, and formulate corporate responses to the service failures caused by the COVID-19 crisis (Wang et al., 2021). Interpretation focuses on developing advanced visualisation to produce explicable insights and help managers to greatly improve hotel performance. This is evident in the case of Wyndham Hotels & Resorts, where the company has extensively utilised social media data to capture the insight from guests' reviews in order to explore operational areas for service quality improvement, thereby boosting customer satisfaction.

As we observed, SMA has been acknowledged to play a pivotal role in many aspects of hotel management. However, many hotel practitioners jump on the SMA bandwagon without the necessary consideration. This study offers the novel insight that organisational sensing and responding agility is a prerequisite of SMAC development. This implies that SMA cannot be deployed to substitute for hotel employees in sensing market opportunities and responding to customer needs. In fact, the successful development of SMAC relies heavily on human involvement, where human agents need to create taxonomies, apply algorithms suitable for the specific business goals, and design metrics and reports (Holsapple et al., 2018). Although SMA

can quickly capture customer perceptions and has the potential to supplement traditional marketing research, it requires higher-order cognitive skills such as connecting data to the marketing problem and critically interpreting SMA reports for decision-making (Moe and Schweidel, 2017). With this in mind, hotel practitioners should improve their organisational sensing and responding ability before instructing their employees to make deliberate efforts in implementing SMA.

We further highlight the importance of SMAC as a mediator between sensing agility and hotel performance. A well-developed SMAC could create significant potential to transform sensing agility into superior performance. While hotels do not have control over word-of-mouth on social media, their SMA-powered sensing agility can amplify the effectiveness of social media marketing campaigns. By leveraging SMAC for market-sensing programs, hotels are in a good position to explore markets with analytics metrics (e.g., click-through rate, engagement metrics, awareness, and customer sentiment). Therefore, hotel practitioners should develop sensing agility hand-in-hand with SMAC. Hilton Hotels & Resorts is a typical example hereof, as they have developed sensing agility to improve the quality of customer service by monitoring their social media metrics in real time. This can be used to complement traditional means of consumer engagement and interaction, thus allowing hotel managers promptly to sense customer needs in online environments (Bredava, 2018).

5.3. Limitations and Avenues for Future Research

While this study provides several noteworthy implications, there are also some limitations, which provide opportunities for further research. First, the results of our study are based on data collected in a specific region of Greece. Cross-country differences have not been considered in this study, which might reduce the generalisability of findings. Therefore, future research is encouraged to carry out additional investigations in other countries.

Second, while the use of perceptual measures as proxies of organisational capability, such as the SMAC observed in this study, is a common practice in the literature (e.g., Lu and Ramamurthy, 2011), future research is encouraged to use alternative sources of data to complement these measurements. For example, by using the details included in firms' recruitment advertisements, researchers could aggregately capture the organisational capability in handling certain tasks in terms of employees' skillsets (e.g., social media analysts). In addition, on the infrastructure level, researchers could assess databases such as the G2 Company Tech Stack for the historical records of firms adopting the relevant social media analytical tools.

Third, while we made great efforts to address the common method bias, such as using different sources of data for independent and dependent variables and separating independent and dependent constructs temporally, the sample we constructed is still subject to the single informant limitation (Olya, 2021; Lindell and Whitney, 2001). We suggest that future research should adopt a multi-informant approach to perfect the empirical design. For instance, the questionnaire data would ideally be collected from different managers within the same hotel to measure organisational agility (e.g., data collected from the CEO) and SMAC (e.g., data collected from IT managers) separately.

Owing to the complexity and context specificity of focus regarding organisational agility (e.g., internal focused and supply chain focused) in the existing literature (Roberts and Grover, 2012a; Tse et al., 2016; Sambamurthy et al., 2003), it was impossible to include the entire domain of organisational agility in one study. Therefore, we suggest that future research should examine the roles of other potential organisational agility factors in our theoretical framework.

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