Big Data Analytics and Hotel Guest Experience: A Critical Analysis of the Literature

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Abstract

Purpose

Guest experience and satisfaction have been central constructs in the hospitality management literature for decades. In recent years, the use of big data as an increasing trending practice in hospitality research has been characterised as a modern approach which offers valuable insights into understanding and enhancing guest experience and satisfaction. Recognising such potential, both researchers and practitioners need to better understand big data's application and contribution in the hospitality landscape. This paper critically reviews and synthesizes the literature to shed light on trends and extant patterns in the application of big data in hospitality, particularly in research focusing on hotel guest experience and satisfaction.

Design/Methodology/approach

This research is based on a Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) literature review of academic journal articles in Google Scholar published up to the end of 2020.

Findings

By data types, user-generated content, especially online reviews and ratings were at the centre of attention for hospitality-related big data research. By variables, the hospitality-related big data fell into two crucial factor categories: physical environment and guest-to-staff interactions.

Originality/value

This paper shows that big data research can create new insights into attributes that have been extensively researched in the hospitality field. It facilitates a thorough understanding of

big data studies and provides valuable insights into future prospects for both researchers and practitioners.

Keywords: big data, analytics, guest experience, guest satisfaction, hospitality

1. Introduction

Following technological advances, appearance and popularity of digital platforms, and the adoption of smart devices, extensive data in both structured and unstructured forms are generated, stored, recorded and compiled, thus creating big data. The notion of "Big Data" has been extensively popular in both academic and non-academic media. The concept has created a real buzz, especially on the internet and social media. The circumlocution determines the massive scale of data generated by rapid technology development and the dramatically escalating adoption of devices allowing for connection to the internet. The use of mobile devices such as smartphones and tablets has resulted in data explosion (Verhoef et al., 2016) in conjunction with user-generated content emanating from online social networks. Considering the volume and characteristics of big data, it is been used widely in numerous fields, e.g., science (Felt, 2016), tourism (Mariani & Baggio, 2021; Xiang et al., 2015), business (Sivarajah et al., 2017), healthcare (Agrawal & Prabakaran, 2020), engineering (Madanayake & Egbu, 2019), and information systems (Hashem et al., 2015).

Despite its extensive use, no uniform definition of big data exists yet. For some, it can be considered as "a collective intelligence of human individuals shared mainly through the technological environment" (Madanayake & Egbu, 2019, p. 530). Laney (2001) characterised big data as the 3Vs: Volume, Variety and Velocity. Later, the 3V concept has been extended to 4V by adding Value to the feature usefulness of big data (Gantz & Reinsel, 2011). Similarly, Kitchin (2014) described the characteristics of big data as "huge in volume, high in velocity, diverse in variety, exhaustive in scope, fine-grained in resolution, relational in nature, and flexible in trait" (p.68). Despite how big data has been defined differently, an overwhelming amount of complex and heterogeneous data are generated and consumed on a daily basis. The availability of big data has enhanced our abilities to address real world issues with a remarkable depth, scale and breath (Mayer-Schönberger & Cukier, 2013). Moreover, big data helps to create new ways to complement traditional research approaches, such as surveys and archival data sources (Xiang et al., 2015). In general, the availability of big data and numerous analytical approaches and methods associated with it, have made significant contributions to knowledge

creation in different fields including tourism and hospitality (Li et al., 2018) as well as plays a significant role for value creation in business practice.

In the hospitality field, hotel guest satisfaction and guest experience have long been an area of concern as they can contribute to customer loyalty, repeat visit, and positive word-of-mouth (Mohsin & Lengler, 2015; Padma & Ahn, 2020). In particular, the hotel industry is known as one of the most competitive industries by providing homogenous services. In such a competitive environment, guest satisfaction is one of the key factors of hotel performance. While researchers use conventional research approaches to understand the components of guest satisfaction and experience, big data has been shown the ability to assist researchers to develop novel and meaningful insights into the phenomenon (e.g., Xiang et al., 2015). The use of big data allows researchers to overcome the challenges of using a representative sample (Mariani et al, 2018) through employing the entire population under scrutiny (Gerard et al., 2016). Seemingly, it has provided the tools for researchers to develop an alternative and potentially better understanding of guest's opinions, ideas, and behaviours. As such, it has proved to be an effective tool to extensively evaluate guest experience and satisfaction (e.g., Aakash & Gupta Aggarwal, 2020; Lee et al., 2020; Moro et al., 2019; Padma & Ahn, 2020; Ying et al., 2020).

This paper aims to offer a critical review of existing studies using big data in the hospitality landscape. Some recent literature reviews have analysed certain features of big data studies in tourism and hospitality, such as business intelligence and big data in hospitality and tourism (Mariani et al., 2018), big data and analytics in hospitality and tourism (Mariani and Baggio, 2021), and big data and artificial intelligence in hospitality and tourism (Lv, et al., 2021). However, prior literature reviews on big data primarily focused on both the hospitality and tourism domain, providing limited understanding of big data's application in specific areas, such as guest experience. Therefore, the objective of this study is to provide a focused, thorough review on the intersections between big data and guest experience and satisfaction in order to inform the future of big data research by providing several useful insights into its progress in the hospitality landscape.

2. Understanding hotel guest experience: From traditional methods to Big Data

Hotel guest experience is a core construct in hotel management, because it directly contributes to customers satisfaction (Mohsin & Lengler, 2015), brand identity (Sukhu et al.,

financial performance (Oh & Parks, 1996), and revisit intentions and loyalty (Kandampully & Suhartanto, 2000; Padma & Ahn, 2020). Guest satisfaction is identified to play a significant role in sustaining revenues by retaining existing and loyal customers (Prasad, 2014). Xiang et al. (2015) discussed that the association between guest experience and satisfaction is strong and guest experience and satisfaction are inherently connected.

Researchers have attempted to identify variables that affect guest experience and guest satisfaction by using different methods. The vast majority of existing studies depend on traditional methods such as survey and focus groups, which mainly focused only on one aspect of guest experience and guest satisfaction. For example, even though hotels might be seen as an industry with intangible areas of guest experience (Hargreaves, 2015), both tangible and intangible attributes were identified to play roles in influencing the experience of hotel guests (Prasad et al., 2014). Tangible attributes focus on room amenities, cleanliness of room, quality of mattress and pillow, adequate lighting and hotel facilities. Intangible attributes include hotel ambiance, employee friendliness and service quality (Gundersen et al., 1996). For example, Ranjbari et al. (2020) in their study to map the service quality of short-stay accommodation sharing, identified the high importance of concepts such as price reasonability, cleanliness, furniture (tangible), friendly manner, helpfulness and extra help (intangible) for Airbnb guests. Therefore, ensuring that both tangible and intangible aspects exceed the expectations of hotel guests is in response to an ever-increasing demand for quality guest experience (Hargreaves, 2015).

To examine the impacts of both tangible and intangible attributes, Lo and Yeung (2019) developed and tested a model to measure hotel guest experience based on three variables: physical environment (PE), guest-to-staff encounters (GSEs), and guest-to-guest encounters (GGEs). The study's findings show the significant effects of all three dimensions with PE being the most important factor affecting guest experience. Hotels can therefore be considered as a place of experience (Sukhu et al., 2019). Similarly, Xiang (2015) argued that "guest satisfaction can be seen as the guest's evaluation of his/her experience through interaction with various service areas (p.122)". PE, as one of the limited tangible attributes is used to provide the first impression and pleasurable experience before guest interactions with employees or other guests (Lin, 2004; Nguyen, 2006). GSEs as an intangible attribute in shaping guest experience can be studied using the four dimensions of employee attitude, professional behaviour, proactive service, and appearance (Walls et al., 2011). Similarly, guests' social interactions with other guests are found to have both direct positive and negative impacts on guest experience and

satisfaction (Huang & Hsu, 2009; Lo & Yeung, 2019). Studying the hotel guest experience of obese people, Poria et al. (2021) identified both PE and interactions with other guests playing significant roles in shaping guest experience and satisfaction. The study's findings reveal that how constraints arising from the physical environment and other guests gazing at the obese guests can affect their experience. Creating a pleasant experience will therefore require attention to both physical and human aspects of guest interactions (Lo & Yeung, 2019). Such attention to all dimensions of guest experience helps guests associate value with their stay, which results in desired outcomes such as loyalty, revisit intention and positive WOM (Lo & Yeung, 2019; Padma & Ahn, 2020).

Sukhu et al. (2019) discussed the factors influencing guest experience in terms of physical and social elements. Physical elements can be defined as ambiance or special arrangements, whereas social elements refer to employee and guest interactions. Such attempt to investigate different elements has the aim of capturing the cognitive and emotional responses that may influence guest experience. While studies show that both responses play a role in shaping experience (Ko, 2018), emotionally attached guests were shown to be more likely to repurchase and engage in WOM (Torres et al., 2014). Customers can retrieve memories when they are distinctive, positive and memorable (Hosany & Witham, 2009). Such memorable experiences occur when guests perceive with more than one of their five senses (Lee et al., 2019; Pine & Gilmore, 1998). Creating multisensory experiences leads to a 'wow' moment, satisfaction and unique experience (Lee et al., 2020). Similarly, Lee et al. (2019) identified the significant role of multisensory experience in enhancing hotel guest experiences. The authors argued that such an experience can be considered as an innovative marketing tool with its moderating role on the relationship between affective/cognitive evaluation of guest experience being significant.

Despite the attempts to understand guest experience and satisfaction, managing such experiences in hospitality can be daunting as experiences are individualised in nature (Knutson et al., 2009). Research shows people from different nationalities and cultures can vary in their priorities, having different preferences and expectations from hoteliers (Torres et al., 2014). Therefore, creating value for guests in the form of memorable experiences, requires seeing each experience through the guest lens to understand his/her background beliefs, values, attitudes and priorities (Knutson et al., 2009). However, limitations associated with traditional methods such as survey or interviews can affect the credibility of findings and conclusions. Lv et al., (2021) argued that survey data in tourism and hospitality can be restricted to "adequately

capture spatial, temporal or spatiotemporal attributes of consumers" (p. 146). Similarly, Liu & Beldona (2021) argued that using traditional methods to investigate customer experiences with limited samples compromises the study's conclusion and makes it difficult to generalise the findings.

Advances in the Internet of Things (IoT,) appearance and the popularity of digital platforms, and the adoption of smart devices post-2013 have resulted in an enormous amount of data being produced by both service providers and consumers or by the emerging trend of big data. Big data generated from devices or tracking technologies for example, provide the opportunity to more precisely investigate individuals' preferences and behaviours in real-time (Hallo et al., 2012). Similarly, online reviews and geolocated photos can capture the whole process of the visit, providing an understanding of visitors' experiences and satisfaction (Lv et al., 2021; Ma et al, 2018). This is because major social media platforms have now provided the opportunity for individuals to share every aspect of their travel, demonstrating their feelings, attitudes, and preferences. It is also suggested that the use of big data in examining visitors' preference can eliminate the bias and subjectivity of sampling as it uses sources such as User Generated Content (UGC) instead of stated preferences (Yang et al., 2018) enabling the researcher to answer more questions regarding individuals' attitudes and views (Mariani et al., 2018). Compared to traditional methods such as surveys with small samples, big data can provide a better cross-cultural understanding in hospitality with larger and more precise information (Chatterjee & Mandal, 2010). For example, Mariani et al., (2018) identified the critical role of language in hospitality marketing by analysing around 500,000 reviews on Booking.com.

However, it should also be noted that even though big data has been playing an increasingly important role in transforming research and practice in hospitality, the availability of such data does not necessarily improve researchers' and managers' decision making. This is because the availability of big data does not directly guarantee the availability of knowledge (Line et al., 2020). There is a risk of misinterpretations when working with huge volume of unstructured data such as online reviews (Mayer-Scho¨nberger & Cukier, 2013). Similarly, it is argued that the most challenging task in using big data is the interpretation process to extract useful knowledge for decision making (Mariani et al., 2018; Mariani et al 2021). Even in the case of structured big data obtained from sources such as professional or government documents and debates, its effectiveness can be limited as it lacks the flexibility to be adjusted according to research aims and questions (Lv et al., 2022). Ethical privacy and security

concerns are other issues associated with the use of big data in hospitality. While big data is gathered to personalise products and services in tourism and hospitality, it can increase the risk of data breaches. Examples can be seen when data breaches occurred in Marriot International from 2014 to 2018 affecting 500 million customers (Armerding, 2018). With consumers' growing awareness about the value of personal information, gaining and maintaining customers' trust therefore becomes a challenging task in hospitality (Yallop & Seraphin 2020).

3. Methods

Given the growing effect of big data on research and practice in hospitality, particularly in understanding guest experiences and satisfaction (Mariani et al., 2021; Lv et al., 2022), this study aims to develop a scientific and holistic review of the studies on big data analytics and hotel guest experience. To achieve this goal, a literature search was conducted using the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) statement. PRISMA provides the reader with a better understanding of the selection process (Knobloch et al., 2011). To identify eligible studies, data for this systematic review were sourced from Google Scholar between February and March 2021, a powerful web search engine known for its rich repository of journals in the hospitality field. The searching key words comprised 'guest experience', 'guest satisfaction', 'hotel guest experience', 'hotel guest satisfaction', or 'hotel experience' coupled with a phrase associated to big data including 'data mining', 'big data', 'volume data', 'UGC', 'text mining', 'sentiment analysis' or 'online review'. Up to 10 pages of Google scholar results for each combination were reviewed.

Studies included in this research had to meet the bellow criteria. They must relate to big data in the field of hospitality and guest experience. Big data or comparable terms must appear in the title or abstract. Only those studies published up to the end of 2020 were selected. To ensure the quality and reliability of literature, only studies published in English were included. Furthermore, only journal articles were retained for further analysis. Book chapters, conference papers, books, websites, theses, and other documents were deleted from the records.

Using this search strategy, 262 records were identified. After removing 35 duplicates, title and abstract screening was conducted. Thereafter, the aforementioned criteria were applied for inclusion and exclusion of studies in the next phase. The process resulted in the exclusion of 90 studies, because, although the studies were related to big data, guest experience was not the main objective of these studies.

After completing the process of screening and analysing articles, a total of 78 studies met the eligibility criteria. The study selection process is illustrated schematically in Figure 1 using the PRISMA flowchart. Subsequently, in order to analyse the collected journal articles, we manually recorded attributes of each journal article containing title, author/s, publication year, publication source, and abstracts. At this point, a detailed reading was undertaken for further analysis.

[Figure 1 Inserts Here]

4. Results and Discussion

4.1 Data

The articles analyzed in this research were published in 44 journals. As presented in Table 1, more than 35% of the articles were published in the following four journals: *International Journal of Hospitality Management, International Journal of Contemporary Hospitality Management, Journal of Hospitality Marketing & Management, Journal of Hospitality and Tourism Technology.* The number of articles published in each journal varied from 1 to 10 articles (Table 1).

Moreover, as presented in Table 1, most of journals are in the hospitality area while a few are associated to tourism and marketing (e.g., Journal of Travel Research and American Journal of Marketing Research).

[Table 1 Inserts Here]

Figure 2 shows the annual records of articles of guest experience and big data study in hospitality domain with the very first article published in 2009. Generally, from 2009 to 2013, the number of articles increased annually; however, the number decreased in some years compared to the prior years (for example, 2012). From 2013, the lowest rise in the number of publications was two publications annually; however, the number of publications dropped again in 2016. Moreover, amongst the 78 articles we compiled, 8 were published in 2016, 10 in 2017, 12 in 2018, and 15 in 2019 respectively. In 2020, the record of publications touched the maximum number with 16 publications.

[Figure 2 Inserts Here]

4.2 Understanding hotel guest experience: the role of big data

This section critically reviews the existing hospitality-related big data research from two different perspectives: first, big data types and its characteristics, and second, variables and attributes. The analysis demonstrated that a number of different types of big data have been utilised in hospitality studies. We categorized big data into three groups: 1) UGC data, 2) operation data and 3) device data. Such perspectives provide a better understanding of how big data has been applied and has influenced the research in the hospitality landscape, particularly guest experience and satisfaction. In the subsequent sections, we discuss the application of big data type and attributes in hospitality studies.

4.2.1 Big data types and its characteristics

Big data was identified to enhance the decision-making process and gain competitive advantages over business rivals (Sivarajah et al., 2017), generate new knowledge to enhance decision making (Chen et al., 2013), and promote innovative and actionable insights for businesses (Jukic et al., 2015). Similarly in tourism and hospitality, the usefulness of big data, especially UGC in the form of online reviews, photos/videos and content in social networking sites, as has been realized as rich sources of data in understanding a range of managerial issues including guest experiences and evaluation of the services (Schuckert et al., 2015; Xiang et al., 2017). Specifically, in the hospitality context, UGC can be considered as "representing an individual customer's unique lodging experience" (Liu et al., 2017, p. 555), which provides the opportunity to better understand guests' preferences and behaviour (Alrawadieh & Law, 2019). UGC data are beneficial for investigating hospitality issues particularly at the individual level. For example, Yang et al. (2018) in their paper on guest satisfaction and urban hotel location argued that unlike traditional survey studies, which frequently applies "stated preference" to examine guest experience, big data studies utilize UGC (for example, online reviews) as the "revealed preference".

In the hospitality and tourism fields, big data is created through three dominant sources, namely users, operations (transaction data) and devices (Li et al., 2018). Through technological development and adoption, users generate and share their own content (in terms of text, photos, etc.) via social media platforms which are also referred to as UGC platforms. UGC platforms are extensive and continue to grow in the tourism and hospitality industry (Xiang & Gretzel, 2010) providing a unique opportunity for the mining and analysis of individuals' opinions and interactions (Felt, 2016). Online consumer reviews have been broadly acknowledged as one of

the most powerful types of UGC for understanding feelings, sentiments, moods and consumer behaviour, and company performance in hospitality and tourism (Browning et al., 2013; Cantallops & Salvi, 2014). For example, some researchers have collected huge volumes of online reviews to determine guests' behaviour, preferences, and satisfaction (e.g., Ye et al., 2011; Vu et al., 2019). Lv et al., (2021) have attempted to synthetise big data and artificial intelligence in hospitality and tourism. They identified UGC as the main source of big data used to investigate individuals' preferences and satisfaction. Their study further revealed that guest satisfaction towards hotels received the most attention among studies utilising UGC to explore individuals' satisfaction and preferences. Recently photos as another form of UGC data aroused significant attention in tourism and hospitality research. Photos incorporate rich information related to users, location, and time, adding a new perspective to the study of guest satisfaction/experience. Moreover, some researchers have utilised both photos and online reviews to gain a deeper understanding of guests' behaviours (e.g., Ma et al., 2018).

Transaction data generated via online transactions such as online booking and purchasing, webpage visiting, and web searching also constitute a valuable type of big data. Search engines are one of the key sources of big data, recording the web-searching operations for tourism-related content. Search traces resulting from tourist information searches via search engines are stored and become a valuable type of big data to understand tourism demand and tourist flows (Li, Hu & Li, 2020). In addition to web search data, other transaction data include online booking data, consumer cart data, highway traffic data, and webpage visiting data. Transaction data is believed to assist in understanding tourist behaviours and improving tourism marketing (Li et al., 2018).

With the rapid development of the Internet of Things (IoT) and the development of diverse sensor devices, researchers are able to track tourist movements through global positioning system (GPS) data, Bluetooth data, and mobile-roaming data (Ahas et al., 2011). Compared to traditional data such as survey data, device data has the benefit of tracking technologies which assist researchers to explore issues more accurately owing to tracking in real-time that able to catch the whole process of the visit (Hallo et al., 2012). The application of GPS, Bluetooth and mobile-roaming big data is used to track tourists' special movements to understand their behaviours in space and time. While GPS application has been widely used, Bluetooth and mobile-roaming data appear to be in their early stage of application in tourism research (Li et al., 2018). Within this context, big data analytics has been recommended as a new research paradigm that applies diverse sources of data and analytical tools to make assumptions and predictions about reality (Boyd & Crawford, 2012).

While the literature using big data analytics in the tourism field generally used three sources from which the data originated: UGC, transaction (operation), and devices, (e.g., Guo et al., 2017; Zheng et al., 2017; Peng et al., 2017), our critical review shows that hospitality research primarily used UGC sources to study guest satisfaction. Among UGC data, research on hotel guest experience and satisfaction has mainly focussed on online reviews and ratings, while other types of data such as video data, photo, and multi-type data have made a limited contribution to hotel guest experience research.

Despite the rapid growth in the hotel guest experience research using big data, there is still room for development and improvement. For example, the other big data sources, operations, and devices can deliver a rich mine of information to provide new perspectives of influential factors affecting guest experience and satisfaction. With advance of IoT, various devices have been developed and used to track tourists' movements, such as WIFI data, Bluetooth data, GPS data, RFID data, and mobile-roaming data (Shoval & Ahvas, 2016). For example, in tourism, researchers used geo-tagged photos to investigate visitors' activities (Vu et al., 2015), explore tourists' origins (Da et al., 2012), and discover popular tourism destinations (Lee et al., 2014). Photo data have also been studied for discovering travel recommendations, regarding travel routes, travel destinations, etc. (Li, et al., 2018). Using such data can create knowledge and provide new perspectives for understanding hotel guest experience, satisfaction, and behaviour. For example, video monitoring systems can produce a huge volume of data recording hotel guests' actual behaviours.

Some data such as WIFI data and Bluetooth data can be particularly beneficial to study guest experience. For example, they can be used to monitor and study guests' movements, or the time spent in the hotel or in different sections such as lobbies, restaurants and swimming pools. Both Bluetooth and WIFI allow convenient and low-cost tracking systems. Similarly, while online photo data and diverse device data are all specialised in modelling visitors' spatial-temporal behaviour, they consist of a rich mine of valuable information that can be utilised to create new perspectives of understanding tourist behaviour, tourist market, and tourism management. Therefore, it is clear that each type of big data offers its own unique perspectives in understanding guest behavior, as shown in Table 2. In other words, the application of big data to guest satisfaction studies can be widely improved when a variety of types of big data are applied to study hotel guest experience and satisfaction.

[Table 2 Inserts Here]

4.2.2 Variables and attributes

Using the aforementioned valuable big data, researchers have studied factors influencing guest experience from different dimensions. For example, Ting et al. (2017) combined programming and data mining to analyse guest reviews and hotel guest experience to examine its link with satisfaction ratings. Their results showed that different important factors in guest reviews such as the core product, amenities, hotel attributes, staff-related descriptors and evaluation of experience, carried different weights. Similarly, Xiang et al. (2015) utilised a big data approach to understand the relationship between the hotel guest experience and satisfaction. Their results showed several important dimensions of guest experience that also carried varying weights, such as deals, amenities, core products, staff, and family friendliness. Ying et al. (2020) used the big data approach to study the cross-cultural guest experience perspective between Chinese and North American guests. The researchers identified three themes including functionality, staff and price and they further categorised these themes into five subthemes: room, travel, food, environment and hotel facility. The cross-cultural analysis showed that Chinese guests are more likely to refer to lifestyle and social norm-related attributes while North American guests tend to mention lifestyle-related attributes. Thus, big data seems to offer a dynamic instead of a static perspective on guest experience and satisfaction.

Further, big data makes it possible for researchers to identify variables that might not have been studied with traditional approaches such as surveys, interviews, and focus groups. Some scholars have combined traditional data with big data to gain a deeper understanding of guests' experience. For instance, Ranjbar et al. (2020) used a mix-method approach combining UGC and survey to provide a profound insight into the service attributes of Airbnb to guests. Findings from this research jointly revealed that big data can generate a comprehensive insight into a clearer observation and investigation of the positioning of different attributes of guests' experience from a broader perspective.

Hotel guest satisfaction is a part of the complex human experience within the hospitality field. As discussed earlier, studies using a traditional approach revealed three main factors, namely hotel's physical environment, hotel's guest-to-staff interaction, and guest-to-guest interactions, that affect hotel guest experience. Among prior studies that have investigated the

attributes impacting guest experience applying big data, the physical environment has been the subject that has gained the most attention. Findings from prior research that have investigated the variables affecting guest experience utilizing big data have revealed that hotel features (e.g., Liu et al., 2017), the convenience of transportation and hotel location (e.g., Yang et al., 2018), and hotel service quality (Hu et al., 2019) are the most important attributes of guests' experience.

Given the complexity of guest experience, scholars have further suggested that the combination of a various of physical environment attributes determines the level of guests' experience (e.g., room, location, food, Wi-Fi, services and etc). Such an argument postulates that the existence of some of these attributes such as hygiene factors may not positively increase satisfaction, even though their absence can create dissatisfaction. For example, Xu and Li (2016) in studying guest satisfaction divided the physical environment factors into two sub-factors: physical environment factors determining guest dissatisfaction and physical environment factors determining guest satisfaction. Through analysing online reviews, the authors concluded that the dissatisfaction determinants are more specific and more diverse; for example, slow Wi-Fi, smoking and polluted air issues, poor quality restaurants, and noise (Xu & Li, 2016). The determinants of guest satisfaction were more general and related to the core hotel services including room quality, location and accessibility, and staff performance.

Analysing online reviews from TripAdvisor for three to five-star hotels showed that both extremely satisfied and dissatisfied guests shared a common interest in the five categories of physical environment; rooms, locations, food, services and staff (He et al., 2017). Therefore, enhancing the quality of hotel room, service, cleanliness, location, and value have been considered as factors that contribute to overall hotel performance and guest satisfaction (Aakash & Aggarwal, 2020). Moreover, while traditional methods largely employed hotel physical features as latent concepts and utilised subjective self-rated components to evaluate them, big data studies employ analytic means to objectively measure the factors with a sequence of predetermined guidelines. For instance, Yang et al. (2018) extracted online review data of two hundred hotels to empirically evaluate guests' experience of hotel location. By utilising a micro-economic perspective, their research was able to explore the dynamic guests' location's preferences.

Along with the big data studies on physical environmental attributes, hotel room and location attributes were the focus of attention for most big data studies measuring and evaluating guest satisfaction. Hotel room quality has been identified as one of the top influential

factors of hotel guest satisfaction (Alrawadieh & Law, 2019; Li et al., 2013). Sánchez-Franco et al., (2019) studying Las Vegas hotels online reviews revealed that room design is one of the important physical environment factors for guest satisfaction. Even for luxury hotel guests, room-related attributes such as floor, view, cleanliness, bed, table, and bathroom are the important drivers of e-word of mouth (eWOM) and revisit intention (Padma & Ahn, 2020). In similar way, analysing negative online reviews and e-complaints also emphasised the importance of room quality on guest satisfaction. The room quality in terms of its size, furniture, amenities, cleanliness, and bathroom was the most mentioned issue (Alrawadieh & Law, 2019). Similarly, room cleanliness, room noise issues, and bathroom issues have been indicated as the most common complaints for one-star hotel guests (Levy et al., 2013). Therefore, this discussion demonstrates that, within the guest's compound mental model about the hotel experience, there are structured attributes that are commonly satisfy guest or serve as a compulsory condition for guest satisfaction.

Location and accessibility have been considered as one of the most influential attributes of physical environment in the big data approach assisting guests to find hotels easily and save time when planning to visit the surroundings. Consequently, this helps to create guest satisfaction (Xu & Li, 2016). Location was a frequently mentioned factor in online reviews (Alrawadieh & Law, 2019). Furthermore, the key factors of location are accessibility to points of interest, surrounding environment and transport convenience (Alrawadieh & Law, 2019). Studying guest satisfaction with urbane hotel locations, Yang et al. (2018) classified location-related factors into accessibility to point of interest, surrounding environment and transport convenience. The result of analysing online reviews also indicated that hotels' accessibility to attractions, airports, public transportation, and universities as well as local businesses and green spaces are decisive determinants (Yang et al., 2018). Hotel guests considered location as a substantial attribute in deriving guest satisfaction for all types of hotels. For both budget and luxury hotels, transportation convenience and convenience to tourist attractions have been identified as significant attributes (Li et al., 2013). Luo et al. (2020) discussed that location has been conceded as the dominant factor in the most positive sentiments found in online reviews of economy hotels in China. So, guest enjoyment of experiences is heavily contingent upon hotel location.

Acknowledging the importance of staff's attitude and performance as an influencing variable in deriving guest satisfaction, most studies using big data classified this variable within the dimension of service quality (e.g., Rajaguru & Hassanli, 2018; Alrawadieh & Law, 2019).

Alrawadieh and Law (2019) discussed that service quality is one of the top frequently mentioned factors in online reviews. This is due to the significant role the interaction between guest and staff plays in influencing guest satisfaction. While staff and guest interactions play an important role for all types of hotels, their role is more crucial for lifestyle and prestigious hotels. Comparing lifestyle and traditional hotels indicated that positive and negative interactions between guests and staff were more important in lifestyle hotels due to the nature of lifestyle hotels where personalisation and providing specialised attention to their guests is their centre of attention (Baek et al., 2020). Staff experience and professionalism have been envisaged as the main driving factor for guest satisfaction in Las Vegas hotels owing to their prestigious reputation in entertainment and hosting events and festivals (Sánchez-Franco et al., 2019). For luxury hotels, negative attitudes of staff such as rudeness and unfriendliness, lack of knowledge and professionalism were associated with guest dissatisfaction (Padma & Ahn, 2020). The results of analysing negative online reviews and e-complaints showed that staff's attitudes and performance were the subject of most frequent complaints in luxury hotels (Dinçer & Alrawadieh, 2017). Furthermore, staff's attitudes and performance were the most mentioned issues in online reviews (Alrawadieh & Law, 2019). Comparing guests travelling for leisure purposes and business purposes, Rajaguru and Hassanli (2018) found that the impact of service quality on guest satisfaction was higher for business guests. Business travellers' stay at a hotel is normally paid by their employers; thus, quality plays a significant role in their satisfaction. Therefore, staff performance in industries, such as the hotel industry, where the interaction between guests and staff is relatively high, plays a significant role in overall guest experience and satisfaction. The focus on positive guest-staff interaction leads to high-quality hotel service (Baek et al., 2020).

Although research using big data to investigate factors affecting hotel guest experience and satisfaction mainly focused on physical environment and guest-to-staff satisfaction, the main contribution of these studies is to facilitate delving deeper into these two factors to investigate more variables and attributes that affect hotel guest experience and satisfaction. Moreover, due to the nature of big data, these studies evaluate several variables and antecedents at the same time allowing the researcher to create a better picture of the hotel guest experience. However, there is still a lack of research applying big data to identify and evaluate the guest-to-guest encounter factor and their impact on hotel guest experience and satisfaction. Therefore, there is a need for more research on guest-to-staff and guest-to-guest encounters.

5. Conclusion

Our research acts as a guide to offer an overview of how big data was utilised in hospitality studies with a focus on hotel guest experiences and satisfaction. Acknowledging that various types of big data have different features and were utilised to explore various matters, a critical literature analysis is of tremendous value to gain an in-depth understanding of existing studies and offer insights for future studies.

This paper reviewed 78 publications on guest experience and big data published between 2009 and 2020. Although our study identified an increasing trend in the hospitality literature evaluating hotel guest experience and satisfaction using big data, there is still ample room to further expand hospitality studies using big data, particularly from the perspectives of data type and their applications.

The findings of this study present valuable theoretical implications. On the one hand, although big data has constantly drawn attention in the hospitality industry, specifically in the guest experience, to the best of our knowledge no study has been conducted to summarize the accelerating trend in this area. Therefore, this critical review provides a guideline to inform and expand hospitality researchers' understanding about the existing status of guest experience and big data and consequently offers remarkable opportunities and profound insights for future studies. On the other hand, this review emphasized the importance of big data in guest experience research and determined the main types of big data and attributes studied in past years. However, our work has contributed to the knowledge in the field and calls for future work regarding the potential impact of big data in studying guest experience. This is particularly important as big data can strengthen researchers' abilities to study a phenomenon on a massive scale, providing the opportunity to better understand the impacts of all variables and attributes influencing individuals' experiences. Such in-depth research can contribute to developing a framework that can assist to identify decisive challenges in the hospitality industry in delivering positive guest experiences.

The findings of this research also offer a practical implication to the industry. The research findings provide a guideline on how industries can use big data to promote and develop sustainable approaches in hospitality. For hospitality managers, this paper could assist them to recognise new opportunities for developing their business processes. The growth of big data definitely creates an opportunity for the industry; however, the use of this valuable data depends on managers' related knowledge. Big data has provided a massive opportunity by

opening the door to vast knowledge and information. It is now up to managers and practitioners to understand how such developments in technology can be translated into positive experiences in the hospitality landscape. Therefore, this review could present guidelines to understand the potential value of big data in practice.

While we have presented a holistic and critical review of big data in the guest experience area, the method utilised in this study has several limitations that should be acknowledged. It should be noted that book chapters, theses, reports, conference papers, websites and other documents were excluded from the analysis. In future literature reviews, additional forms of publications could be added in the study to capture a great depth of understanding of big data in the guest experience area. This research also excluded non-English journal articles from the analysis. This limitation suggests a direction for future research to investigate whether non-English journal articles have the potential to add additional information to the knowledge of big data and the guest experience.

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Table 1: List of Source Journal

Journal	Number	Percentage
International Journal of Hospitality Management	10	13%
International Journal of Contemporary Hospitality Management	10	13%
Journal of Hospitality Marketing & Management	5	6.5%
Journal of Hospitality and Tourism Technology	4	5%
Journal of Travel Research	3	3.9%
International Journal of Hospitality & Tourism Administration	3	3.9%
Journal of Business Research	3	3.9%
American Journal of Marketing Research	2	2.7%
Cornal Hospitality Quarterly	2	2.7%
Other Journals	35	45.4 %

Table 2: Big data Types and characteristics used in tourism and hospitality field.

Dominant Sources	Data Types	Characteristics
Users	Online Reviews Ratings Photos	Understanding individuals' opinions, feelings, sentiments, moods, and interactions.
Transaction Data	Online booking and purchasing Webpage visiting Web Searching Consumer carts data Highway traffic data	Assists in understanding tourist behaviours and tourism marketing such as tourism demand, hotel demand, and tourists flows.
Devices	GPS data Bluetooth data Mobile roaming data	Tracking tourists' special movements to understand tourist behaviour in space and time.

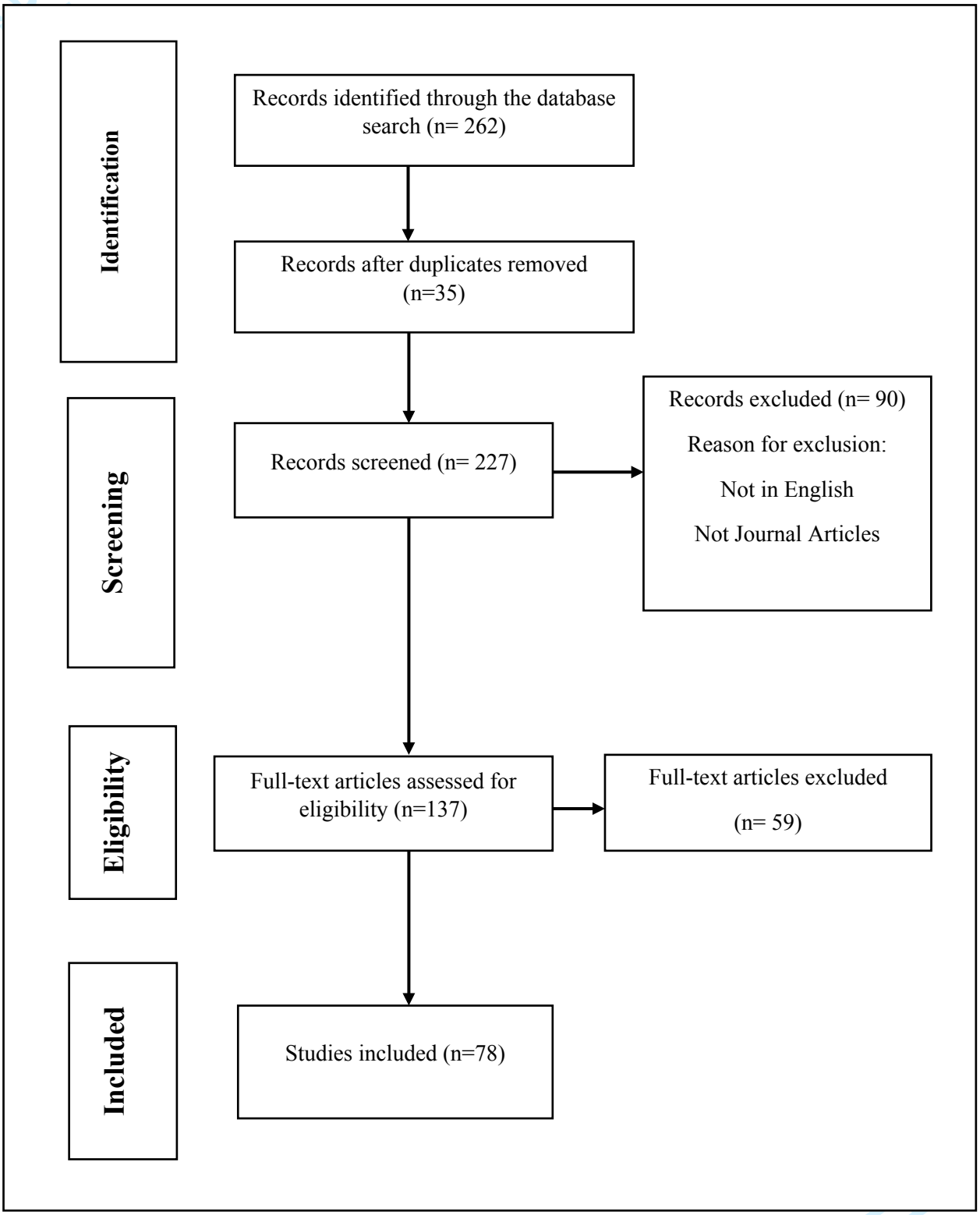

Figure 1: Study Selection

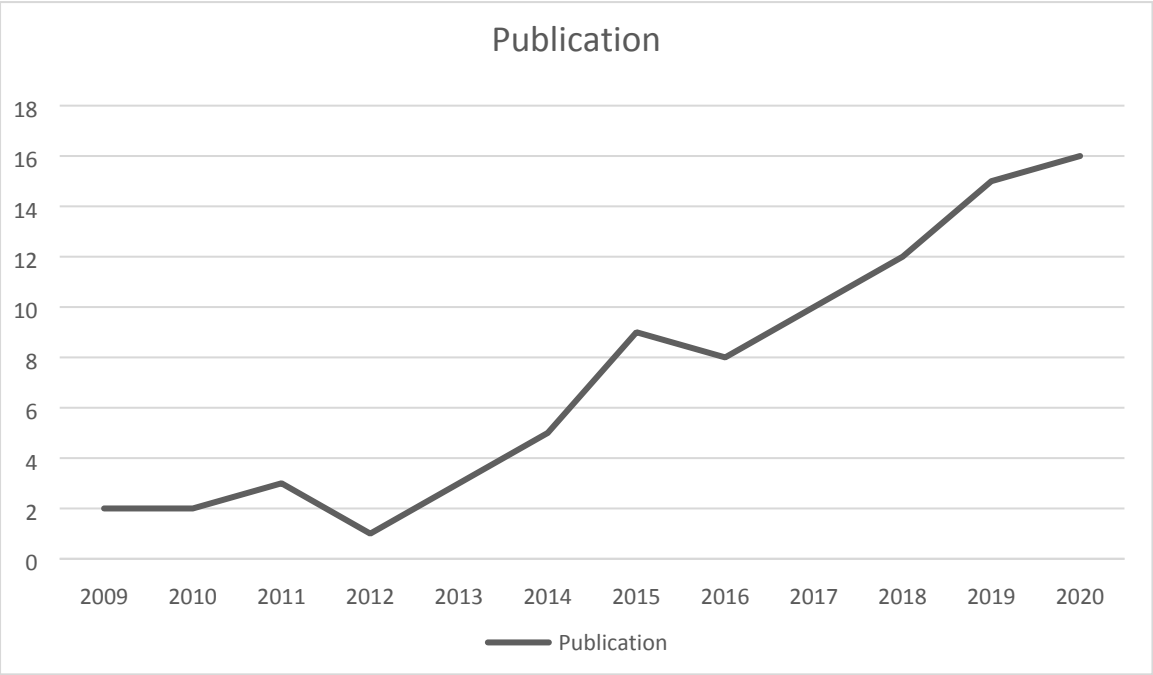

Figure 2: Frequency of Publications from 2009 to 2020.

Big Data Analytics and Hotel Guest Experience: A Critical Analysis of the Literature

Dear Editor and Reviewers:

Firstly, we appreciate your encouragement, recognising the value of our research, and providing the opportunity to revise and resubmit our manuscript. We would like to thank you for your detailed review, constructive critique and identification of areas in need of further development and/or revision. Your feedback has helped strengthen the manuscript and its contribution. As such, we have made substantial revisions to all sections of the paper in response to the reviewers' comments. The manuscript was edited based on the reviewers' valuable feedback, keeping in mind the word limit for a research article in the International Journal of Contemporary Hospitality Management. This document indicates the section(s) where changes have been made in the manuscript.

Sincerely,

The authors

Reviewer # 1:

Reviewer Comments	Author Response
1. *Originality: Does the paper contain new and significant information adequate to justify publication? The authors are commended for selecting an interesting research topic by reviewing the trends and patterns of big data application in hospitality landscape. However, the authors need to address several areas of concern more carefully in the manuscript.* A. *The major weakness of the paper comes from the poor methods, and* B. *uncleared contributions to the knowledge.* C. *Authors need to reconsider/rewrite the review sections while incorporating important and recent studies in order to justify distinct contribution of this study.*	Thank you for your comments, we found them extremely helpful in revising the manuscript. Following your recommendations, we have made substantial revisions in all sections of the paper. We have added the methodology section. The section provides the research methods and the process we followed in collecting and analysing the data which led to writing the manuscript. The discussion in the Literature Review section is now revised and expanded following your suggestions and the comments by the reviewers to include recent studies. The discussion in the section is now stronger as a result demonstrating the search background, the need and significance of the study and its contributions. Following the changes in the other sections of the paper, we have also restructure and rewrote the conclusion section to highlight the contributions and implications of the paper. All the changes made throughout the paper was with the aim to better justify distinct contribution of this study.

Big Data Analytics and Hotel Guest Experience: A Critical Analysis of the Literature

2. *Relationship to Literature: Does the paper demonstrate an adequate understanding of the relevant literature in the field and cite an appropriate range of literature sources? Is any significant work ignored?* A. *The biggest concern I have is that the discussion about the types of data regarding "devices". The authors were arguing it should have enormous rooms to be studied in the hospitality sector, but have you considered "privacy" issues which are the most concerning issues in terms of customers who are using public areas of hotels are motely worried about? Hope you could review the relevant journals of data privacy, and would better to discuss how to solve those issues as well.* B. *When it comes to discussing the 'guest to guest encounters', it might be better to consider the concept of CCB (customer citizenship behaviour, especially 'helping' dimension) when it comes to the research to identify and evaluate GGEs factors and other impacts.* C. *There is lack of discussions about why there has been studied only a few 'guest to staff encounters" in terms of hotel guests' experiences and satisfaction? The authors are required to discuss more clearly.*	Thank you for your comments. Following the earlier comments and as mentioned above, the literature review section was revised to incorporate new information and discussions. For example, the section now discusses different issues associated with the use of big data such as interpretation, availability of knowledge, and privacy. For example, regarding the privacy issue the sections presents the below argument: "Ethical privacy and security concerns are other issues associated with the use of big data in hospitality. While big data is gathered to personalise products and services in tourism and hospitality, it can increase the risk of data breaches. Examples can be seen when data breaches occurred in Marriot International from 2014 to 2018 affecting 500 million customers (Armerding, 2018). With consumers' growing awareness about the value of personal information, gaining and maintaining customers' trust therefore becomes a challenging task in hospitality (Yallop & Seraphin 2020)." In addition, by presenting the method section, we now discuss the process that led us to identifying the relevant journal articles for this study. Although there are various important points associated with big data in the literature, the review process and discussion in our manuscript is based on the arguments presented in the selected studies for this research. For example, identifying the gap, we highlighted that there is a need for more research on guest to staff encounters and how understanding such relationships can affect guest experience and satisfaction.
3. Methodology: Is the paper's argument built on an appropriate base of theory, concepts, or other ideas? Has the research or equivalent intellectual work on which the paper is based been well designed? Are the methods employed appropriate? *Methodology should need more work and improvement – I was not able to find any discussion about methods – having no evidence of methodology how to collect data (journals) with which criteria (any inclusion or exclusion*	Thank you for these very important comments. We realised the need for including the detailed method section. Following the comments by the reviewers, the methodology section was added to clearly discuss the process of data collection (journals articles) and data analysis. **"3.0 Method:** To achieve the aim of this study, a literature search was conducted using the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) statement. PRISMA provides the reader with a better understanding

criteria), and with how many journals you have selected, and how to extract and synthesise the selected data, then how to analyse, then how you could draw the findings and results? *The proper methods sections should be included in your manuscript to discuss your detailed methods design other than demonstrating just two tables: big data types and characteristics, and variables and attributes used in traditional methods and big data.*	of the selection process (Knobloch et al., 2011). To identify eligible studies, data for this systematic review were sourced from Google Scholar between February and March 2021, a powerful web search engine known for its rich repository of journals in the hospitality field. The searching key words comprised 'Guest experience' or 'guest satisfaction' or 'hotel guest experience' or 'hotel guest satisfaction' or 'hotel experience' coupled with a term concerning big data; 'big data' or 'volume data' or 'data mining' or 'UGC' or 'text mining' or 'sentiment analysis' or 'online review'. Up to 10 pages of Google scholar results for each combination were reviewed. Studies included in this review had to meet the following criteria. They must relate to big data in the field of hospitality and guest experience. Big data or comparable terms must appear in the title or abstract. Only those studies published up to the end of 2020 were selected. To ensure reliability and the quality of literature, only studies written in English were considered. Furthermore, only journal articles were retained for further analysis. Theses, books, book chapters, conference papers, websites and other documents were removed from the records. Through this search strategy, 262 records were identified. After removing 35 duplicates, the title and abstract screening was conducted. Thereafter, the aforementioned criteria were applied for inclusion and exclusion of studies in the next phase. This resulted in the exclusion of 90 records. Although the studies were related to big data, guest experience was not the main objective of these studies. After completing the process of screening and analysing articles, a total of 78 articles met the eligibility criteria. The study selection process is illustrated schematically in Figure 1 using the PRISMA flowchart. Subsequently, in order to analyse the collected journal articles, we have manually recorded attributes of each journal article containing title, author/s, publication year, publication source, and abstracts. At this point, a detailed reading was undertaken for further analysis."
4. *Results: Are results presented clearly and analysed appropriately? Do the conclusions adequately tie together the other elements of the paper?*	Thank you for these very important comments. Following your comments, the result section was added to clearly presents the distribution of the studies based on journal sources and publication year. Moreover, we have made a

Big Data Analytics and Hotel Guest Experience: A Critical Analysis of the Literature

A. *The way of presentation of results is weak. Honestly, proper results section was not presented, although given this paper is about "critical review".* B. *Also, especially discussing the bridging the gap in the existing literature and knowledge section requires improvement, it should be written to clearly highlight implication for only one point (researchers focus mostly on pre-determined factors in social media platform) which was tried to clarifying the reason why there is a paucity of the areas of research about 'guest to guest encounter' relatively compared to other two factors ('physical environment' and 'guest to staff encounters').* C. *Discussing only two perspectives would be the best way to present the "critical" analysis of previous big data studies in hospitality context so far?*	substantial amount of revision to all sections of results and discussion. We are aware that there is a possibility for considering different perspectives to critically analysis of previous big data studies in hospitality context. However, as mentioned above, the results and discussion in this manuscript are based on the criteria used to collect data and the arguments presented in the selected studies for this research. **"4.0 Results and Discussion** Before critically reviewing the studies, this section provides an overview that sets out the distribution of the studies. **4.1 Distribution of the studies** The articles noted in this research were published in 44 different journals. As presented in Table 1, more than 35% of the articles were published in the following four journals: *International Journal of Hospitality Management, International Journal of Contemporary Hospitality Management, Journal of Hospitality Marketing & Management, Journal of Hospitality and Tourism Technology.* The number of articles published in each journal varied from 1 to 10 articles (Table 1). Furthermore, as shown in Table 1, most of journals identified are in the hospitality domain while a few are related to tourism and marketing (e.g., Journal of Travel Research and American Journal of Marketing Research). Figure 2 presents the annual numbers of published articles of guest experience and big data research in hospitality field. The first publication we found was published in 2009. Generally, from 2009 to 2013, the number of articles increased annually; however, the number dropped in some years compared to the previous year (e.g., 2012). From 2013, the smallest increase in the number of publications was 2 publications annually; however, the number of publications dropped again in 2016. Furthermore, among the 78 articles we collected, 8 were published in 2016, 10 in 2017, 12 in 2018, and 15 in 2019 respectively. In 2020, the number of publications reached the highest level with 16 publications."
5. *Implications for research, practice and/or society: Does the paper identify*	Thank you for these comments.

clearly any implications for research, practice and/or society? Does the paper bridge the gap between theory and practice? How can the research be used in practice (economic and commercial impact), in teaching, to influence public policy, in research (contributing to the body of knowledge)? What is the impact upon society (influencing public attitudes, affecting quality of life)? Are these implications consistent with the findings and conclusions of the paper?: *A. The manuscript has very weak justification its novelty clearly with very weak research rational and reasoning. Without your reviewed paper, do you think we really cannot understand guest experiences and satisfaction?* *B. The authors drew the conclusion from two different perspectives (big data types/characteristics, and variables/attributes) – which criteria made those two categories? Without systematic/logical analysis, the manuscript is ended up enumerating existing a few journals with only descriptively narrated, having lack of convincing/reliable evidence of reviewed previous journals in this paper – no amount of good facts would make good story.* *C. It is hard to capture what is the purpose of this study. What made you can bridge the knowledge gap in the literature? Among three factors you were discussing (PE, GSEs, GGEs), the conclusion of "lack of GGEs research were existing" is totally not enough to support your research originality. Implications and contributions of this study have to be strengthened.*	We have restructured and rewrote the conclusion section to address your comments. The changes are based on the revisions in the other sections of the paper to better present the arguments leading to the final section of the paper. The Conclusion and Implications Section now discusses that: **"**Our research acts as a pathfinder to offer an overview of how big data was utilised in hospitality research with a focus on hotel guest experiences and satisfaction. Acknowledging that different types of big data have different characteristics and were utilised to explore various issues, a critical literature analysis is of tremendous value to gain a systematic understanding of existing research and provide insights for future studies. This research reviewed 78 publications on guest experience and big data published between 2009 and 2020. Although our study identified an increasing trend in the hospitality literature evaluating hotel guest experience and satisfaction using big data, there is still ample room to further develop hospitality research using big data, especially from the perspectives of data type and their application. The findings of this study present valuable theoretical implications. On the one hand, although big data has constantly drawn attention in the hospitality industry, specifically in the guest experience, to the best of our knowledge no study has been conducted to summarize the accelerating trend in this area. Therefore, this critical review provides a guideline to inform and expand hospitality researchers' understanding about the existing status of guest experience and big data and consequently offers profound insights and remarkable opportunities for future research. On the other hand, this review highlighted the importance of big data in guest experience research and determined the major types of big data and attributes studied in past years. However, this work has contributed to the knowledge in the field and calls for future work regarding the potential impact of big data in studying guest experience. This is particularly important as big data can strengthen researchers' abilities to study a phenomenon on a massive scale, providing the opportunity to better understand the impacts of all variables and attributes influencing individuals' experiences. Such in-depth research can contribute to developing a framework that can

	assist to identify decisive challenges in the hospitality industry in delivering positive guest experiences. The findings of this research also offer a practical implication to the industry. The research findings provide a guideline on how industries can use big data to promote and develop sustainable approaches in hospitality. For hospitality managers, this paper could assist them to recognise new opportunities for developing their business processes. The growth of big data definitely creates an opportunity for the industry; however, the use of this valuable data depends on managers' related knowledge. Big data has provided a massive opportunity by opening the door to vast knowledge and information. It is now up to managers and practitioners to understand how such developments in technology can be translated into positive experiences in the hospitality landscape. Therefore, this review could present guidelines to understand the potential value of big data in practice. While we have presented a holistic and critical review of big data in the guest experience area, the method utilised in this study has several limitations that should be acknowledged. It should be noted that book chapters, theses, reports, conference papers, websites and other documents were excluded from the analysis. In future literature reviews, additional types of publications could be included in the analysis to capture a greater depth of understanding of big data in the guest experience area. This research also excluded non-English journal articles from the analysis. This limitation suggests a direction for future research to investigate whether non-English journal articles have the potential to add additional information to the knowledge of big data and the guest experience." We have made substantial revisions in all sections of the paper, and we discussed the purpose of the study and the knowledge gap clearly in the introduction and Literature Review sections. For example, we highlighted that: "Acknowledging that big data has extensively influenced research in the hospitality landscape, particularly the traditional guest experience and guest satisfaction research based on traditional data, a critical review on existing research using

	big data in the hospitality landscape is required. There are some recent literature reviews that have analysed certain aspects of big data studies in hospitality and tourism, such as business intelligence and big data in hospitality and tourism (Mariani et al., 2018), big data and analytics in hospitality and tourism (Mariani and Baggio, 2021), and big data and artificial intelligence in hospitality and tourism (Lv, et al., 2021). However, there remains a major research gap as scientific literature reviews on hotel guest experiences and big data are still limited. Previous literature reviews on big data focused on both the hospitality and tourism domain, providing limited understanding of big data's application in specific areas, such as guest experience. To present a more comprehensive review of how big data can shed light on guest experience, there is a need for a systematic literature review. Therefore, the objective of this paper is to provide a comprehensive review on big data and guest experience to inform the future of big data research by providing several useful insights into its progress in the hospitality landscape." As mentioned earlier by adding a method section, we explained the process and criteria used to collect, analyse, and interpret the data leading to the discussion on different perspectives.
6. *Quality of Communication: Does the paper clearly express its case, measured against the technical language of the field and the expected knowledge of the journal's readership?* *A. Has attention been paid to the clarity of expression and readability, such as sentence structure, jargon use, acronyms, etc.: English language is not a major issue, but rather argument styles and logical flow is fluent. However, the authors would better to follow the official form of IJCHM, especially numbering the titles etc.*	Thank you for your comments. Th manuscript was revised (major revisions) to better present the arguments. We have also numbered the sections.

Big Data Analytics and Hotel Guest Experience: A Critical Analysis of the Literature

Reviewer # 2:

Reviewer Comments	Author Response
This research paper, although titled as "Critical Review", just summarizes the literature as a running narrative. It appears as an extended "literature review" section of an empirical research paper. In this paper (in the section "Understanding hotel guest experience: the role of big data), authors mention two perspectives of reviewing big-data research: "big data types" and "big data variables and attributes". The paper is simply a review of some research articles involving these "big data types" and "big data variables and attributes". However, the title of the article says "Big Data Analytics and Hotel Guest Experience". This paper does not talk or mention about big data analytic techniques used in the literature. For example, whether the articles reviewed used "Natural Language Processing", "Text Mining", "Sentiment Analysis", "Social Network Analysis", or other Data Mining/Machine Learning techniques. A summary of such information in the form of a table would provide better information to the reader.	Thank you for your valuable comments. Following your comments, we have made substantial revisions (major revisions) in all sections of the paper. Moreover, we have added the methodology and results sections to clearly discussed the process of data collection (journal articles), data analysis and distribution of the data. We further discussed how the review process was based on the arguments presented in the selected studies for this research.
A. *The paper does cite several papers from the literature, but does not demonstrate the coverage of a range of literature sources. In a typical systematic or critical review articles, researchers do talk about the scope of the work and list the process used in arriving at the list of articles used for the review. This is not clear in this paper.* B. *Authors divided their study into two broad sections: 1) "Understanding hotel guest experience: the traditional methods" and 2) "Understanding hotel guest experience: the role of big data". However, the connection between these two sections vis-à-vis the title of the paper does not appear to be clearly justified.* C. *Under the section "Understanding hotel guest experience: the traditional methods", authors provide a running summary (narrative) of studies that have used survey and/or focus groups methods. However, there can be other*	That is a valid point, and we appreciate your suggestions. Following your recommendations and also suggestions by the other reviewers, we have made substantial revisions in all sections of the paper, particularly the literature review section. The section was restructured, and a number of paragraphs rewritten to address these comments. In revising the literature review section, our aim was to critically analyse the concept of guest experience and big data with particular attention to the aim of the study. The section now provides an in-depth discussion drawing from different sources. For example, the section now discusses different issues such as interpretation, availability of knowledge, and privacy associated with the use of big data in hospitality. We also discussed the purpose of the study and the knowledge gap clearly in the introduction and Literature Review sections to better link different sections of the manuscript. Having the opportunity to revise the manuscript, we also included relevant and recent arguments

methods as well such as case studies, interviews, etc.,. It would help the reader if the authors summarize this literature in a tabular form giving the details of research methods used, variables used, findings, etc.,.	in the literature to further discuss the implications of this work. The next section discusses the research method and the process we followed to collect and analyse the data. The process then led to presenting the results and the findings and discussions of the study the following sections.
A. *Typically, systematic reviews or critical literature reviews involve a process or methodology in which a keyword search is performed on the body of literature. For example using "PRISMA" methodology. This process involves screening/filtering irrelevant literature from the initial search results and narrowing down to only those articles that are relevant. This process sets the stage or defines the scope of the review process. It also helps the reader knowing the extent of literature used in the review process. No such process/methodology is mentioned in this paper. Further, this literature review also does not seem to follow any framework in defining the scope of the review. This summarization appears to be a free flowing review of randomly selected articles.* B. *Authors mention about three different sources through which big-data can be generated. In Table-1, these different types of data and corresponding sources are listed. However, it is not clear about why these data types are considered part of "big-data". Similarly, while discussing about "Variables and Attributes", there is no clarity on why the so called attributes are considered "big-data*".	Thank you for this important comment and suggestion. The methodology section was added to clearly discuss the process of data collection (journals articles) and data analysis. **"3.0 Method:** To achieve the aim of this study, a literature search was conducted using the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) statement. PRISMA provides the reader with a better understanding of the selection process (Knobloch et al., 2011). To identify eligible studies, data for this systematic review were sourced from Google Scholar between February and March 2021, a powerful web search engine known for its rich repository of journals in the hospitality field. The searching key words comprised 'Guest experience' or 'guest satisfaction' or 'hotel guest experience' or 'hotel guest satisfaction' or 'hotel experience' coupled with a term concerning big data; 'big data' or 'volume data' or 'data mining' or 'UGC' or 'text mining' or 'sentiment analysis' or 'online review'. Up to 10 pages of Google scholar results for each combination were reviewed. Studies included in this review had to meet the following criteria. They must relate to big data in the field of hospitality and guest experience. Big data or comparable terms must appear in the title or abstract. Only those studies published up to the end of 2020 were selected. To ensure reliability and the quality of literature, only studies written in English were considered. Furthermore, only journal articles were retained for further analysis. Theses, books, book chapters, conference papers, websites and other documents were removed from the records. Through this search strategy, 262 records were identified. After removing 35 duplicates, the title and abstract screening was conducted. Thereafter, the aforementioned criteria were applied for inclusion and exclusion of studies in

	the next phase. This resulted in the exclusion of 90 records. Although the studies were related to big data, guest experience was not the main objective of these studies. After completing the process of screening and analysing articles, a total of 78 articles met the eligibility criteria. The study selection process is illustrated schematically in Figure 1 using the PRISMA flowchart. Subsequently, in order to analyse the collected journal articles, we have manually recorded attributes of each journal article containing title, author/s, publication year, publication source, and abstracts. At this point, a detailed reading was undertaken for further analysis." We hope the revisions now show how the points presented and discussed in the Results and Discussion sections are based on the arguments presented in the selected studies for this research.
A. *This paper is about critical review of articles in hospitality literature that involves using big-data for evaluating and understanding guest experience & guest satisfaction. Since this is not an empirical study, there is no particular section to present the results. The review of the articles itself is the "results".* B. *Conclusions section says that the study "identified an increasing trend in hospitality literature evaluating hotel guest experience and satisfaction by using large quantities of data (big data)". Unfortunately, no evidence is provided to substantiate this "increasing trend". Further, there is no evidence to support the statement "large quantities of data (big data)". It would help if the authors can show how large the datasets were in the articles chosen for review.* C. *In the conclusion section authors say that "… 'guest to guest encounters' received very little attention'". Authors further went on to say "guest to guest interaction in hotels' share area such as*	This is a valid point, and we appreciate your comments. Following your comments, we have added the Method section which is now followed by the Results and Discussion section. This section presents the results and findings of the study under different headings. Section 4.1 presents the distribution of the studies/ journal articles. The next section (section 4.2) presents the finding of the study and critically discusses the arguments in the journal articles. Following the above changes, we have also revised the Conclusion Section to better present the implications of the study and recommendations for the future research. "**5.0 Conclusion** Our research acts as a pathfinder to offer an overview of how big data was utilised in hospitality research with a focus on hotel guest experiences and satisfaction. Acknowledging that different types of big data have different characteristics and were utilised to explore various issues, a critical literature analysis is of tremendous value to gain a systematic understanding of existing research and provide insights for future studies. This research reviewed 78 publications on guest experience and big data published between 2009 and 2020. Although our study identified an

swimming pool, gym and restaurants deserve a deep and extensive research which can be used to observe guests' actual behaviours, reactions and experiences". However, they fail to explain or hint at how this so-called "deep research" can/should be performed. If authors could provide an agenda for the future research, this would tie back to what they said in their introduction "…this study critically reviews the past to inform the future of big data research by providing several useful insights into its progress in the hospitality landscape."	increasing trend in the hospitality literature evaluating hotel guest experience and satisfaction using big data, there is still ample room to further develop hospitality research using big data, especially from the perspectives of data type and their application. The findings of this study present valuable theoretical implications. On the one hand, although big data has constantly drawn attention in the hospitality industry, specifically in the guest experience, to the best of our knowledge no study has been conducted to summarize the accelerating trend in this area. Therefore, this critical review provides a guideline to inform and expand hospitality researchers' understanding about the existing status of guest experience and big data and consequently offers profound insights and remarkable opportunities for future research. On the other hand, this review highlighted the importance of big data in guest experience research and determined the major types of big data and attributes studied in past years. However, this work has contributed to the knowledge in the field and calls for future work regarding the potential impact of big data in studying guest experience. This is particularly important as big data can strengthen researchers' abilities to study a phenomenon on a massive scale, providing the opportunity to better understand the impacts of all variables and attributes influencing individuals' experiences. Such in-depth research can contribute to developing a framework that can assist to identify decisive challenges in the hospitality industry in delivering positive guest experiences. The findings of this research also offer a practical implication to the industry. The research findings provide a guideline on how industries can use big data to promote and develop sustainable approaches in hospitality. For hospitality managers, this paper could assist them to recognise new opportunities for developing their business processes. The growth of big data definitely creates an opportunity for the industry; however, the use of this valuable data depends on managers' related knowledge. Big data has provided a massive opportunity by opening the door to vast knowledge and information. It is now up to managers and practitioners to understand how such developments in technology can be translated into positive experiences in the hospitality landscape. Therefore, this review could present

	guidelines to understand the potential value of big data in practice. While we have presented a holistic and critical review of big data in the guest experience area, the method utilised in this study has several limitations that should be acknowledged. It should be noted that book chapters, theses, reports, conference papers, websites and other documents were excluded from the analysis. In future literature reviews, additional types of publications could be included in the analysis to capture a greater depth of understanding of big data in the guest experience area. This research also excluded non-English journal articles from the analysis. This limitation suggests a direction for future research to investigate whether non-English journal articles have the potential to add additional information to the knowledge of big data and the guest experience."
A. *Typically, Big data analytics involves the "use of advanced analytic techniques against very large, diverse data sets that include structured, semi-structured and unstructured data, from different sources, and in different sizes from terabytes to zettabytes."* *(Ref: https://www.ibm.com/in-en/analytics/hadoop/big-data-analytics)* *This paper does not address how exactly "big-data analytics" is used in the literature and its connection to the guest satisfaction. Since the article is about "big-data analytics", authors should provide evidence about how and techniques of big-data analytics used in these research studies.* B. *Author claim that "bridging the gap in the existing literature and knowledge on the application of big data to hotel guest experience studies can be broadly improved from both theoretical and practical perspectives". However, there is no clarity on what these theoretical perspectives are.* *The article does not address several questions listed here. However, I can understand that not every research*	This is a valid point, and we appreciate your suggestions. In our revisions, we have discussed in the introduction section that "there are some recent literature reviews that have analysed certain aspects of big data studies in hospitality and tourism, such as business intelligence and big data in hospitality and tourism (Mariani et al., 2018), big data and analytics in hospitality and tourism (Mariani and Baggio, 2021), and big data and artificial intelligence in hospitality and tourism (Lv, et al., 2021). However, there remains a major research gap as scientific literature reviews on hotel guest experiences and big data are still limited. Previous literature reviews on big data focused on both the hospitality and tourism domain, providing limited understanding of big data's application in specific areas, such as guest experience". Following your recommendations and as mentioned above, we have made substantial revisions in all sections of the paper including Literature Review and Conclusion Sections. We hope the changes now addresses your comments on reviewing other studies and also the implications of the study.

should or can address all these questions.	
The extent to which the paper is written seems to be good. No particular communication issues such as formation of sentence structure and use of acronyms/jargon are noticed.	Thank you for your comment.

Reviewer # 3:

Reviewer Comments	Author response
The manuscript presents a critical review of the existent literature addressing big data usage in hospitality research with a particular emphasis on hotel guest experience and satisfaction. This is a timely and welcomed review since, when properly set, would constitute a valuable tool for researchers in hospitality, showing the panorama of related works already published. However, for publication in IJCHM, the paper needs to be added a critical reflection, as well as to be carefully rewritten, improving its legibility and correctness. *Mostly, English writing makes reading easy. Nevertheless, there are many (and I stress, many) points where, either an article is missing (mostly the particle 'the'), or the verbal form is incorrectly spelled. Additionally, although there is no misspell or incorrectness, the authors use expressions that are not commonly used in English. For example, look on page 7, lines 31 to 36, where it reads "UGC data has been used by many researchers in the hospitality research through using online reviews and also rating released on social media platforms to understand hotel guest experience and satisfaction. However, this can be argued that this hospitality research field (...)". In these phrases, the terms "through using", "and also", and "this can be argued that" sound awkward. Therefore, I would strongly recommend to the authors the use of professional help in a final English revision of the manuscript for posterior publication.*	Thank you for your comments. We found them extremely helpful in revising the manuscript. We have used help from professional editing services to improve the English revision of the manuscript.
Although the authors state that no definition of big data has been established yet, there is already an informal agreement around the need of the 4 V's characteristics for classifying a set of data as big data. As such, and since this is a major point to distinguish large data from big data, please abstain from describing big data as	The point made is well taken. We have deleted the statement from the manuscript.

"large quantities of data", as stated in pg. 12, lines 24-25.	
First and foremost, this review misses an important point: the methodology employed. Namely, how were the papers collected and chosen for the review? What were the keywords employed? What databases were used? What filters/decisions were used to discard/keep papers?	Thank you for these very important comments. The Methodology Section was added to clearly discuss the process of data collection (journals articles) and data analysis. **"3.0 Method:** To achieve the aim of this study, a literature search was conducted using the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) statement. PRISMA provides the reader with a better understanding of the selection process (Knobloch et al., 2011). To identify eligible studies, data for this systematic review were sourced from Google Scholar between February and March 2021, a powerful web search engine known for its rich repository of journals in the hospitality field. The searching key words comprised 'Guest experience' or 'guest satisfaction' or 'hotel guest experience' or 'hotel guest satisfaction' or 'hotel experience' coupled with a term concerning big data; 'big data' or 'volume data' or 'data mining' or 'UGC' or 'text mining' or 'sentiment analysis' or 'online review'. Up to 10 pages of Google scholar results for each combination were reviewed. Studies included in this review had to meet the following criteria. They must relate to big data in the field of hospitality and guest experience. Big data or comparable terms must appear in the title or abstract. Only those studies published up to the end of 2020 were selected. To ensure reliability and the quality of literature, only studies written in English were considered. Furthermore, only journal articles were retained for further analysis. Theses, books, book chapters, conference papers, websites and other documents were removed from the records. Through this search strategy, 262 records were identified. After removing 35 duplicates, the title and abstract screening was conducted. Thereafter, the aforementioned criteria were applied for inclusion and exclusion of studies in the next phase. This resulted in the exclusion of 90 records. Although the studies were related to big data, guest experience was not the main objective of these studies. After completing the process of screening and analysing articles, a total of 78 articles met the eligibility criteria. The study selection process is

	illustrated schematically in Figure 1 using the PRISMA flowchart. Subsequently, in order to analyse the collected journal articles, we have manually recorded attributes of each journal article containing title, author/s, publication year, publication source, and abstracts. At this point, a detailed reading was undertaken for further analysis."
Secondly, but no less important, there seem to be some important references missing in the text. There are previous surveys that also included the analysis of big data usage in Hospitality research. Noteworthy, the works by Mariani et al. like: *Mariani, M., Baggio, R., Fuchs, M. and Höepken, W. (2018), "Business intelligence and big data in hospitality and tourism: a systematic literature review", International Journal of Contemporary Hospitality Management, Vol. 30 No. 12, pp. 3514-3554.* *https://doi.org/10.1108/IJCHM-07-2017-0461* *but also other reviews, like* *Hui Lv, Si Shi & Dogan Gursoy (2021) A look back and a leap forward: a review and synthesis of big data and artificial intelligence literature in hospitality and tourism, Journal of Hospitality Marketing & Management.* *https://doi.org/10.1080/19368623.2021.1937434* *These, or other, reviews are important to establish what the present manuscript brings as added value for the current state-of-the-art.* *Also of utmost importance is the discussion of the authors' findings in the light of the position papers:* *Mariani, M. (2020), "Big Data and analytics in tourism and hospitality: a perspective article", Tourism Review, Vol. 75 No. 1, pp. 299-303. https://doi.org/10.1108/TR-06-2019-0259* *and also of Yallop et al. paper, in terms of the ethical aspects of big data usage and applications:* *Yallop, A. and Seraphin, H. (2020), "Big data and analytics in tourism and hospitality: opportunities and risks", Journal of Tourism Futures, Vol. 6 No. 3, pp. 257-262. https://doi.org/10.1108/JTF-10-2019-0108.*	Thank you for your comments and suggesting the valuable sources. We found them extremely helpful and added the relevant discussions from the recommended sources to our paper.
Finally, also amiss is the setting of final conclusions in terms of possible limitations of this literature survey and the authors' thoughts towards future directions of research using big data.	Thank you for this comment. We have restructured and rewritten the conclusion section. In the conclusion section, we have discussed the limitations of our study and have also presented directions for future research.

	"While we have presented a holistic and critical review of big data in the guest experience area, the method utilised in this study has several limitations that should be acknowledged. It should be noted that book chapters, theses, reports, conference papers, websites and other documents were excluded from the analysis. In future literature reviews, additional types of publications could be included in the analysis to capture a greater depth of understanding of big data in the guest experience area. This research also excluded non-English journal articles from the analysis. This limitation suggests a direction for future research to investigate whether non-English journal articles have the potential to add additional information to the knowledge of big data and the guest experience."
For more specific comments: *pg. 3, lines 13-14: Although referred to in the text, there is no reference corresponding to (Mariani et al, 2017).* *pg. 5, lines 26-27: There is something wrong with the first citing reference, where it reads "(Johnson, 2018 in lee)".* *pg. 5, lines 53-54: There are commas missing in 'first' and 'second'. (Personally, I would choose to delete both words from the phrase.)* *pg. 6, lines 37-38: Need to correct the verbal form in "which referred as UGC".* *pg. 6, lines 48-49: "Photos" needs clarification. (are you referring to photo.com or another platform?)* *pg. 7, lines 13-14: The initial phrase is missing an article.* *pg. 7, lines 37-38: Remove the term 'big' from "(...) generally used three sources that big data originated from: (...)". In fact, this whole paragraph should be rewritten since it presents awkward language constructions and incorrections.* *pg. 7, lines 43: Remove the plural from "(...) guest experience and satisfactions (...)".* *pg. 7, lines 53-54: Another awkward English construction: "With advance development (...)".* *pg. 8, line 3: Another place where the phrase misses a verb: "Photo data also adequately studied for discovering (...)".* *Table 2: Remove "Such as:" from the second*	Thank you for identifying these errors and we have carefully edited the manuscript. Thank you so much for all your help in making this a much-improved manuscript.

and third columns. *pg. 12, lines 27-28: What do the authors mean by 'data type' in "especially from the perspectives of data type and its application (...)"? (Structured x Unstructured? Categorical x Quantitative?) In the following paragraphs, it seems that the authors meant the type to be one if the diverse sources of data. This needs clarification, here and anywhere else where the ambiguity might arise in the text.*	

Comments from Editor/Associate Editor

Reviwer Comments	Author Response
This is an interesting study on an important topic.	Thank you for your kind words and helpful feedback. Your comments are very valuable in assisting us with revising the manuscript.
The study can benefit from a strong copy-editing.	We used a help of a professional editor to edit the draft.
The theoretical implications should be improved further.	Thank you for this important comment. Following your suggestion, we have rewritten the theoretical implications. "The findings of this study present valuable theoretical implications. On the one hand, although big data has constantly drawn attention in the hospitality industry, specifically in the guest experience, to the best of our knowledge no study has been conducted to summarize the accelerating trend in this area. Therefore, this critical review provides a guideline to inform and expand hospitality researchers' understanding about the existing status of guest experience and big data and consequently offers profound insights and remarkable opportunities for future research. On the other hand, this review highlighted the importance of big data in guest experience research and determined the major types of big

	data and attributes studied in past years. However, this work has contributed to the knowledge in the field and calls for future work regarding the potential impact of big data in studying guest experience. This is particularly important as big data can strengthen researchers' abilities to study a phenomenon on a massive scale, providing the opportunity to better understand the impacts of all variables and attributes influencing individuals' experiences. Such in-depth research can contribute to developing a framework that can assist to identify decisive challenges in the hospitality industry in delivering positive guest experiences."
The following studies can help the authors with this task. Below studies are just suggestions and the authors may find similar relevant and recent studies. *Ranjbari, M., Shams Esfandabadi, Z. and Scagnelli, S.D. (2020), "A big data approach to map the service quality of short-stay accommodation sharing", International Journal of Contemporary Hospitality Management, Vol. 32 No. 8, pp. 2575-2592. https://doi.org/10.1108/IJCHM-02-2020-0097* *Lee, M., Kwon, W. and Back, K.-J. (2021), "Artificial intelligence for hospitality big data analytics: developing a prediction model of restaurant review helpfulness for customer decision-making", International Journal of Contemporary Hospitality Management, Vol. 33 No. 6, pp. 2117-2136. https://doi.org/10.1108/IJCHM-06-2020-0587* *Mariani, M. and Baggio, R. (2022), "Big data and analytics in hospitality and tourism: a systematic literature review", International Journal of Contemporary Hospitality Management, Vol. 34 No. 1, pp. 231-278. https://doi.org/10.1108/IJCHM-03-2021-0301* *Liu, Y. and Beldona, S. (2021), "Extracting revisit intentions from social media big data: a rule-based classification model", International*	Thank you for your comments and suggesting the valuable sources. We have added the relevant discussions from the recommended sources to our study.

Big Data Analytics and Hotel Guest Experience: A Critical Analysis of the Literature

Journal of Contemporary Hospitality Management, Vol. 33 No. 6, pp. 2176-2193. https://doi.org/10.1108/IJCHM-06-2020-0592

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