The Economic Impacts of ICTs in the Tourism and Hospitality Industry: A Systematic Review of the Literature

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Abstract

Recognizing the pivotal role of information and communication technologies (ICTs) in generating economic benefits within the tourism and hospitality industry, this research aimed to develop a comprehensive understanding of the economic impacts of ICTs through a systematic review of the literature published on this topic since 2000. Synthesizing the information shared in 60 articles, this research presents the methodological approaches and identifies that the economic impacts of ICTs can be categorized into performance (financial and operational), operational efficiency (e.g., cost reduction and operation time saving), and market (e.g., popularity and reputation). Furthermore, this research discusses potential directions for future studies examining the economic impacts of ICTs. The present research contributes to the literature by synthesizing knowledge on the economic impacts of ICTs in the tourism and hospitality industry. The findings also serve as a valuable reference for industry practitioners seeking to navigate the extensive body of knowledge in this field.

Keywords: Systematic Literature Review; Information and Communication Technology; Economic Implications; Economic Impacts; Tourism and Hospitality

1. Research Background

Information and communication technologies (ICTs) have long been used in the tourism and hospitality industry (e.g., Hotel Reservation Network in 1991 and Online Travel Agency in 1995) (Delgado and Mirai, 2023). However, in the past few decades, ICTs have greatly affected the tourism and hospitality industry by automating various tasks (Law et al., 2014; Samara et al., 2020). In the early stages, as highlighted by Buhalis (1998), ICTs gained prevalence in the tourism and hospitality industry for strategic and operational management. For instance, the first property management system was introduced less than 40 years ago to enhance operational performance (Joyce, 2013). As ICTs have increasingly become available in customer-facing areas, such as online travel planning and booking platforms, service robots in hotel lobbies, and self-service kiosks in restaurants, scholars have shifted focus toward examining ICTs from customers' perspectives and perceptions of ICTs, such as adoption intention and post-adoption evaluations (e.g., satisfaction) (see e.g., Tourism — Vishwakarma et al., 2020; Hotel — Shin and Jeong, 2020; Restaurants — Guan et al., 2022). However, research has overlooked the economic impacts of ICTs, which is important for industry practitioners.

ICT investments associated with costs and benefits that require a careful examination. The economic impacts of ICTs are particularly crucial, given that the tourism and hospitality industry is a for-profit sector operating to achieve economic outcomes. These outcomes encompass revenue and profit increases (e.g., Hua et al., 2020; Qian and Zhang, 2023), frequency of visits (e.g., Jiang and McCabe, 2021; Liu and Shi, 2019), and improvements in productivity, time-saving, and cost-effectiveness (e.g., Esparza-Aguilar et al., 2016; Melián-González and Bulchand-Gidumal, 2016). These outcomes are manifestations of diverse functions at the

property, corporate, and destination levels of the tourism and hospitality industry, thereby comprehensively scrutinizing the relevant stakeholders for further evaluation. Additionally, certain ICTs require substantial investment (e.g., robotics and smart waste management). Consequently, business owners and destinations are keenly interested in understanding the economic benefits that ICTs bring to the industry (Melián-González and Bulchand-Gidumal, 2016), compared to the costs associated with such investments (e.g., initial investment and operation costs). In other words, the industry looks for the visible benefits it can get from the introduction of ICTs, which may stimulate their motivations to adopt ICTs strategically. Furthermore, as investments, ICTs require careful assessment, either by enhancing performance or lowering costs (Law et al., 2014). A significant economic impact only occurs when the benefits outweigh the costs of such an ICT investment, motivating shareholders to embrace changes. For example, if a hotel replaces its bellman with service robots, does the replacement indeed reduce the labor cost considering the initial investment and maintenance cost? Therefore, a comprehensive review of the relationship between ICT and economic impacts can help tourism and hospitality scholars further explore this relationship and help managers make informed decisions.

Despite the critical role of technology in enhancing operational efficiency and performance from an economic perspective, there has been limited attention paid to the economic impacts of ICTs in the tourism and hospitality industry. Consequently, scholars in the field have struggled to understand whether investments in ICTs indeed yield economic benefits, supported by empirical evidence. Examining the economic contributions of ICTs to the tourism and hospitality industry is imperative. This research aims to integrate and synthesize evidence regarding the empirical

impacts of ICTs on economic outcomes in the tourism and hospitality industry, providing future research directions through a systematic review of the literature. To achieve this research purpose, journal articles relevant to ICTs and economic outcomes published since 2000 were reviewed. By conducting a systematic review of the literature on ICTs and their economic impacts in the context of the tourism and hospitality industry, this research contributes to our understanding of how ICTs economically benefit the sector. The findings will advance knowledge about ICTs and their economic impacts, guiding potential avenues for future studies. Thus, this research serves as a key reference for tourism and hospitality professionals, aiding decision-making about ICTs by considering their economic impacts.

2. Methodology

The primary aim of this research was to comprehend the current state of knowledge development concerning the economic impacts of ICTs and to outline future research directions. This research employed a systematic review approach, adhering to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Following previous studies that utilized systematic review and bibliometric approaches (e.g., Law et al., 2020; Shin et al., 2023; So et al., 2021; So et al., 2020), the present research adopted a journal-based approach to identify articles from prominent tourism and hospitality journals, assuming that leading journals are more likely to contribute significantly to knowledge development in this field (Law et al., 2020). The journals were selected based on the following criteria: Australian Business Deans Council (ABDC) Journal Quality List, SCImago Q1, Journal Citation Report, Social Science Citation Index (SSCI), and H-Index. Journals that satisfied the above criteria but whose scope did not align with the tourism and hospitality discipline (e.g., sport) were excluded. Consequently, 19

journals were selected for inclusion, presented here in alphabetical order: *Annals of Tourism Research, Asia Pacific Journal of Tourism Research, Current Issues in Tourism, International Journal of Contemporary Hospitality Management, International Journal of Hospitality Management, International Journal of Tourism Research, Journal of Destination Marketing and Management, Journal of Hospitality and Tourism Management, Journal of Hospitality and Tourism Research, Journal of Hospitality Marketing and Management, Journal of Sustainable Tourism, Journal of Travel and Tourism Marketing, Journal of Travel Research, Journal of Vacation Marketing, Scandinavian Journal of Hospitality and Tourism, Tourism Economics, Tourism Geographies, Tourism Management, and Tourism Management Perspectives*.

The next step involved selecting the database for publication retrieval. After comparing potential databases, Scopus was chosen owing to its extensive document database (Visser et al., 2021), and its frequent utilization for systematic reviews and bibliometric analyses (e.g., Shin et al., 2023). In line with previous studies, only full-length publications were included, and publications such as editorials were excluded (e.g., Law et al., 2020; Shin et al., 2023). The search query comprised three key components: (1) ICT-related keywords (e.g., technology*), (2) economic outcome keywords (e.g., revenue), and (3) discipline-related keywords (e.g., tourist*, hospitality, hotel, and restaurant). The ICT-related keywords were determined primarily by research team members with expertise in tourism and hospitality technology, while the economic outcome keywords were initially determined by the research team member specializing in tourism and hospitality economics. The keywords were further refined based on Scopus index keywords. The keywords were finalized after multiple discussions and preliminary data retrieval results.

On September 18, 2023, 672 articles published in the selected journals and containing all three components of keywords in the fields of titles, abstracts, and keywords (TITLE-ABS-KEY) were collected (see Appendix A for search query). To ensure the relevance of the retrieved articles, the research team members carefully evaluated each article by examining the title, abstract, index keywords, author keywords, and, if necessary, the full paper, for its relevance and suitability for inclusion. In cases where members held differing views, they read the full article and engaged in discussions until a unanimous agreement was reached to minimize potential bias (Law et al., 2013). Conceptual articles were deliberately excluded during the discussions because the primary focus of this research was to examine the empirical impacts of ICTs on economic outcomes. Following one additional round of discussion for all selected articles, 60 articles from 15 journals were retained.

3. Results

3.1. Description of Articles on the Economic Impacts of ICTs

Table 1 presents the distribution of articles focusing on the economic impacts of ICTs by journal. Out of the 60 articles, approximately half (n = 31, 51.7%) were published in three journals: *International Journal of Hospitality Management* (n = 11, 18.3%), *International Journal of Contemporary Hospitality Management* (n = 10, 16.7%), and *Tourism Economics* (n = 10, 16.7%). As can be seen in Table 2, there is an observable increase in the number of articles exploring the effects of ICTs on economic outcomes. Specifically, the number of articles focusing on the economic impacts of ICTs was four in the 2000s, 28 in the 2010s, and 28 for the

period between 2020 and September 2023, suggesting a sustained growth in researchers' attention to the economic impacts of ICTs over time.

[Tables 1 & 2]

Building upon methodologies from previous systematic reviews (e.g., So et al., 2020), this research identified research contexts, methodological approaches, data collection methods, and data analytical techniques for a comprehensive understanding of researchers' focus on the economic impacts of ICTs in specific sectors. As Table 3 shows, the sample studies were primarily conducted in the context of the hotel/lodging industry (38.3%) and the tourism industry (38.3%). Seven studies (11.7%) encompassed multiple contexts, such as tourism and hospitality, followed by studies in the restaurants/foodservice context (10%). Table 4 outlines the methodological approaches and data collection methods adopted in the sample studies. While all studies were characterized as empirical research, their methodological approaches varied. A significant majority (86.7%) employed a quantitative approach, with four studies (6.7%) utilizing a qualitative approach and the other four studies (6.7%) adopting a mixed-methods approach. Half of the studies (50.0%) used panel data analysis to achieve their research purposes. Regarding theoretical frameworks, 51.6% of the articles did not incorporate any theories, while others drew on the resource-based view, dynamic capability perspectives, and the gravity model.

[Tables 3 & 4]

Approximately 37% of the articles investigated the impacts of ICTs in a broad sense without specifically focusing on a particular type of technology. These articles employed inclusive terms, such as technology, information technology (IT), IT-enabled systems, and ICTs. A third of the articles (33.3%) focused on digital platforms that facilitate communication between customers and organizations, such as websites, social media, and online review platforms. Five articles (8.3%) delved into management and operation systems, such as accounting information systems, revenue management systems, management control systems, and tracking systems. Given the period covered by the present research, topics such as e-commerce (5%), mobile applications (5%), and robots (3.3%) also featured in the articles. The category of "Other technologies" (8.3%) included diverse technologies such as e-vehicle charging stations, augmented reality, and data analytics.

[Table 5]

3.2. Research Themes

After undergoing three rounds of discussion sessions to synthesize the literature on ICTs' economic impacts in the tourism and hospitality industry, three key research themes emerged: (1) ICTs' impacts on performance, (2) ICTs' impacts on operational efficiency, and (3) ICTs' impacts on the market. Table 6 outlines these distinctive research themes, and the subsequent section provides a detailed description of each theme.

[Table 6]

3.2.1. Research Theme I. Impacts of ICTs on Performance

3.2.1.1. Impacts of ICTs on Financial Performance

Two-thirds of the articles (40 out of 60, 66.7%) focused on financial performance-related variables within the financial performance category. Many studies delved into the positive impacts of ICTs on different aspects of financial performance, such as increased revenue and sales (e.g., Qian and Zhang, 2023; Zaidan, 2017), increased gross operating profit and improved profitability (e.g., Berné et al., 2015; Hua et al., 2020), price-related performance including menu prices and average daily rate (ADR) (e.g., Mhlanga, 2022; Piccoli et al., 2017), and destination-related performance, such as spending and growth (e.g., Rehman et al., 2020; Shehzad et al., 2019). These studies explored the roles of ICTs as antecedents of financial performance from various perspectives.

Eleven articles (18.3%) specifically focused on the effect of social media on financial performance in multiple contexts. For instance, Yost, Zhang and Qi (2021) examined the impact of social media activity and engagement on online food and beverage sales. Azevedo (2021) used photos from social media to assess the recreational value of heritage sites. Kim and Park (2017) compared social media review ratings with traditional customer satisfaction and measured their impacts on hotel performance indicators, such as revenue per available room (RevPAR) and ADR. These studies explored the potential enhancement of financial performance through the strategic use of social media. Few studies have considered the impact of platforms and systems (n = 9, 13.33%) on financial performance. These studies emphasized that the introduction and refinement of such platforms and systems may significantly impact financial performance. Mhlanga (2022), for instance, explored meal-sharing platforms in South Africa and used the

difference-in-difference method to examine their impact on meal prices, the number of customers, and restaurant revenue. Esparza-Aguilar, García-Pérez-de-Lema and Duréndez (2016) examined the implementation of accounting and financial control and management systems affecting the performance of family and non-family small and medium-sized enterprises in the hospitality sector.

Beyond social media and platform/system-based ICTs, general investment in ICT (n = 12) was also examined in tourism and hospitality contexts. Scholars have used secondary data from destination, firm, or property levels to test empirical models. In the tourism context, ICT infrastructure investment data were used to examine the impact of such investments on GDP (e.g., Shehzad et al., 2019; Tang, 2021) and tourist spending (e.g., Rehman et al., 2020). In the hospitality context, various types of ICT investments, such as website (e.g., Nieto et al., 2011) and hotel property-level investment input (e.g., Tavitiyaman et al., 2011), were scrutinized for their influence on performance measures, such as ADR, revenue, sales, and profitability. Overall, the majority of the reviewed articles fall into this category, exploring various types of ICTs and their impact on several financial performance measures in tourism and hospitality contexts.

3.2.1.2. Impacts of ICTs on Operational Performance

A total of 10 articles (16.7%) examined the positive impacts of ICTs on operational performance. Operational performance, in this context, encompasses aspects such as customer visits and frequency (Jang et al., 2021; Liu et al., 2022) and hotel occupancy (Bigné et al., 2019; Xie et al., 2016). The majority of the studies investigated the impact on the hospitality industry using surveys or secondary data. Notably, social media emerged as a prominent technology within this

category. For example, Xie, Chen and Wu (2016) combined managerial responses with online reviews to examine whether lengthy and timely responses could contribute to hotel performance. Kim et al. (2016) analyzed online restaurant reviews and explored the moderating effect of an excellence certificate. Both the number of reviews and the customers' overall ratings were found to have a significant positive impact on restaurant performance.

3.2.2. Research Theme II. Impacts of ICTs on Operational Efficiency

Another theme that emerged was the positive impact of ICTs on operational efficiency, as ICTs facilitate internal processes. Out of the 60 articles, 14 (23%) were categorized under the theme of ICTs' impacts on operation efficiency. Specifically, these articles focused on how ICTs enhance back-of-house operational efficiency, such as increasing productivity, time-saving, and cost-effectiveness. Of these 14 articles, six (43%) explored how ICTs enhance productivity, encompassing both operational and employee performance. For example, through in-depth interviews with hotel managers, Melián-González and Bulchand-Gidumal (2016) discovered that IT increases operational and employee productivity. Specifically, IT was identified as a means to enhance operational efficiency by providing relevant information for management. The study also indicated that IT can enhance employees' productivity, as they can focus more on customer interactions when routine tasks are automated. Esparza-Aguilar, García-Pérez-de-Lema, and Duréndez (2016) found that the use of a management control system positively impacts the performance of family and non-family SMEs in the hospitality industry by improving internal processes. The literature also highlighted that ICTs can increase operational efficiency by saving time. For example, technologies such as revenue management software and market intelligence tools have reduced the time spent pushing or adjusting rates online (Alrawadieh et al., 2021).

Cost-effectiveness derived from ICTs is another prominent topic in the literature. As ICTs can handle routine and repetitive tasks, firms can reduce labor costs (Melián-González and Bulchand-Gidumal, 2016). Additionally, hotel directors stated that using technologies can reduce energy consumption, leading to cost savings (Melián-González and Bulchand-Gidumal, 2016). Sharma and Upneja (2005) examined the factors affecting hotels' performance and found that limited investment in technology hindered hotels' performance. Beyond productivity, time-saving, and cost-effectiveness, studies have also suggested that ICTs can indirectly increase operational efficiency by providing resources and competitive advantages, such as improved advertisement efficiency and public relations (Tsai et al., 2005).

3.2.3. Research Theme III. Impacts of ICTs on Market

A substantial portion of the articles, 26 out of 60 (43.3%), focused on the positive impact of ICTs on markets, investigating how ICTs improve to businesses' market share and the popularity of destinations. Among these, 12 articles (46.2%) concentrated on the business level, while the remaining 14 articles (53.8%) delved into the destination level. Out of the 12 articles that explored the effectiveness of ICTs in improving market share for tourism and hospitality businesses, six articles specifically focused on the hotel context. For example, Horng et al. (2022) highlighted how big data analytics in hotels could enhance their market assets through sustainable marketing. Other studies emphasized the significance of managing online ratings on platforms like TripAdvisor and Booking.com, linking a hotel's rating to critical factors affecting market share, such as sales (Garriogs-Simon et al., 2017). Garrido-Moreno et al. (2018) discussed the usage of social media for customer engagement, emphasizing its potential to

enhance a hotel's market share through improved customer relationship management. Cohen and Olsen (2013) delved into the impact of a hotel's complementary IT resources on market share. Few articles focused on the restaurant context. Liu et al. (2022) investigated a restaurant's online marketing, stressing the importance of online visibility in increasing its market share. In a similar context, Lee et al. (2021) concentrated on social media influencer marketing, explaining effective post types for improving a restaurant's market share. Additionally, travel agencies were targeted to investigate the benefits of ICTs. Berné et al. (2015) found that ICT usage helped travel agencies improve their relationships in the market, such as those with tourism suppliers and operators. Huang (2012) explained how blog marketing could enhance travel agencies' market share. Tsai, Huang and Lin (2015) explored the benefits that travel agencies could obtain through e-commerce development strategies, such as an increase in market share. Lastly, Esparza-Aguilar, García-Pérez-de-Lema and Duréndez (2016) examined the benefits of adopting ICTs for market share across various business domains, including hotels, restaurants, and travel agencies.

As already mentioned, 14 articles examined the positive impact of ICTs on customer attraction at the destination level. Some of these articles discussed a country's usage of ICTs in a broad sense, emphasizing their importance in increasing tourist arrivals. Many articles have argued that a country's level of ICT usage is a crucial factor in attracting tourists (Adeola and Evans, 2020; Kumar and Kumar, 2012; Uyar et al., 2023). Furthermore, some articles have explored the role of a country's ICT usage not only in increasing tourist arrivals but also in improving its economy, such as its GDP (Jiang and McCabe, 2021; Kumar and Kumar, 2012; Shehzad et al., 2019). Jayaraman and Makun (2020) elaborated on the role of ICTs in enhancing a country's

economic performance by facilitating the operation of its tourism sector. Other articles focused on particular ICT sectors. Telecommunication infrastructure investment was analyzed as a cause of increased tourist arrivals (Barman and Nath, 2019; Gholipour et al., 2022). Additionally, the adoption of transportation facilities supported by ICTs in a country was examined for their effect on tourist arrivals (Liu and Shi, 2019). In Wu et al.'s research (2021), a country's investment in financial technology (FinTech) was found to affect the relationship between its economic growth and tourist arrivals. Guedes et al. (2023) focused on a country's investment in online marketing and showed that an increase in its presence on online tourism platforms (e.g., Booking.com, TripAdvisor, and Expedia) leads to a rise in the number of tourist arrivals. Among various online marketing resources, Zhang et al. (2021) paid attention to user-generated content (UGC) on social media and explained how encouraging visitors to post UGC about their travel enhances international arrival distribution. Similarly, Azevedo (2021) argued for the value of UGC on social media for destination marketing, examining the significant effect of the quantity of geo-tagged photos about an attraction on the number of visitors.

4. Discussion and Potential Direction for Future Research on Economic Impacts of ICTs

Based on the synthesis of research on how ICTs economically contribute to the tourism and hospitality industry, potential research directions that may benefit the literature and the industry have been identified from the literature review. More specifically, potential future studies are suggested in the following section by research themes: (1) ICTs' impacts on performance, (2) ICTs' impacts on operational efficiency, and (3) ICTs' impacts on the market. Table 7 provides a summary of potential future research directions.

[Table 7]

4.1. Research Theme I. Impacts of ICTs on Performance

4.1.1. Impacts of ICTs on Financial Performance

The existing literature has predominantly focused on limited sources of data, such as surveys, secondary data (STR, destination website), and social media data. An in-depth analysis of different sources of data is needed to unpack the impacts of ICTs on financial performance. In particular, big data is more than just UGC, which includes online reviews and social media data. There are also transaction data (e.g., credit card data) and device data (e.g., real-time GPS location data) (Li et al., 2018), which deserve more attention. These big data sources contain richer information that can be used to identify how ICTs contribute to financial performance. For example, Raun, Ahas, and Tiru (2016) used mobile tracking data to strengthen tourism destination performance. The visualization for temporal and spatial analyses can accurately demonstrate the gap in performance, followed by effective policy interventions. Additionally, incorporating different data sources could help explore more opportunities to find proxies of financial performance, such as individual-level transaction data and location data. Many financial performance indicators cannot be easily obtained by scholars, as they are considered private information or business secrets. For example, sales volume cannot be easily obtained, yet mobile data traffic or Google traffic data may serve as proxies (e.g., Huang et al., 2023). These proxies can help researchers better evaluate financial performance from another data angle. Therefore, using big data to substitute for relevant information can uncover many opportunities in the ICT-financial performance link. For instance, transaction data are real-GPS location data that can measure the number of visits to a particular location (Banerjee et al., 2021), revealing

the possibility of tracking the number of visitors to different types of venues. Yang, Liu and Chen (2020) utilized daily card transaction data to serve as a proxy for restaurant demand and examined how the COVID-19 pandemic impacted the restaurant industry. Future scholars can explore ICT and financial performance topics with such proxies, helping to investigate research questions that could not be answered due to limited data previously.

4.1.2. Impacts of ICTs on Operational Performance

Given that a relatively low number of articles fall into this category, potential research themes can be explored from multiple angles. First, additional operational performance aspects should be further explored, as the current literature focuses only on broad categories, such as customer visits, frequency, and hotel occupancy. Many performance measures in the back of the house have not received much attention. For example, the operational performance of human resources, finance, or maintenance department employees should be assessed. Second, many ICTs have been adopted to assist tourism and hospitality employees in alleviating their work burden (Gonzalez et al., 2020). The operational performance of ICTs cannot be easily observed but depends on the performance changes in employees. Hence, a longitudinal approach can help identify such changes to precisely evaluate the impacts of ICTs on operational performance. Finally, the current data collection method in this category focuses on surveys and social media analytics. Only one article uses field experiments to capture the nuances in a real-life business setting (Jang et al., 2021). More on-site data collection, such as field experiments and observations, can refine operational performance matrices and establish a close connection between ICTs and operational performance.

4.2. Research Theme II. Impacts of ICTs on Operational Efficiency

From the systematic literature review on ICTs and operational efficiency, two potential research directions emerged. First, while prior studies have explored the benefits of ICTs concerning operational efficiency, limited research has employed longitudinal methods. Most studies relied on cross-sectional data collected through surveys and interviews to explore the effects of ICTs on operational efficiency. Future studies could adopt a longitudinal approach in conjunction with operational data (e.g., the number of customers served in a specific time duration) to measure the progressive increase in operational efficiency over time. For example, a hotel employing service robots might assess operational efficiency (e.g., average time spent on room service delivery) from the point of adoption to full utilization.

Second, studies investigating the economic impacts of ICTs from operational efficiency perspectives have predominantly focused on back-of-house operational efficiency, such as productivity and time-saving. While extensive research has explored customers' perceptions of ICTs (e.g., experience and satisfaction), there is a limited understanding of ICTs' operational efficiency from customers' perspectives. Given that providing efficient and quality service to customers is critical in enhancing their perceived service quality (e.g., the responsiveness dimension of SERVQUAL), it is crucial to explore whether customers perceive operational efficiency resulting from ICTs. Researchers may investigate whether customers perceive increased operational efficiency due to the utilization of ICTs. For example, future studies could explore customers' perceptions of the efficiency of room delivery services facilitated by a robot, such as time-saving.

4.3. Research Theme III. Impacts of ICTs on Market

Prior research examining the influence of ICTs on the market share of tourism and hospitality organizations has been constrained by a narrow business context. The literature review reveals a predominant focus on only three business domains: hotels, restaurants, and tourism agencies. Given the widespread adoption of ICTs across diverse sectors within the tourism and hospitality industry, future investigations could expand their scope to include overlooked domains. For example, future studies could explore the impact of adopting or utilizing ICTs on market share and customer numbers within various sectors such as airlines, conventions, events, galleries, museums, natural attractions, heritage sites, and theme parks. Such a broader perspective would not only diversify the research landscape but would also facilitate an exploration of different types of ICTs.

Moreover, previous studies examining the impact of ICTs on the market have encountered limitations in terms of measurement. Among the 14 articles reviewed, 10 primarily relied on tourist arrivals as the key metric for evaluating a destination's performance. While tourist arrivals serve as a useful proxy, a more comprehensive understanding can be achieved by incorporating additional dimensions. For instance, future studies could employ a range of metrics, including a destination's online and offline popularity, local residents' attitudes toward tourism, population density, crime rates, and environmental sustainability, to gauge different facets of a destination's performance. Future research should employ a more diverse set of measurements to comprehensively assess destination performance, shedding light on the nuanced ways in which ICTs contribute to improvements across various aspects of a destination.

Lastly, previous research on the influence of ICTs on markets has tended to overlook the diverse perspectives of various stakeholders. Many studies exploring the effects of ICTs on the market share in the tourism and hospitality industry have predominantly gathered data from high-level executives, resulting in a lack of input from employees' perspectives in the discourse. By incorporating interviews or surveys not only with high-level executives but also with middle-level managers or even low-level employees, future studies could gather a diverse range of opinions from internal stakeholders regarding the impact of ICTs on a firm's market share. Similarly, investigations into the impact of ICTs on a destination's competitive advantage in the market have primarily centered on the viewpoints of visitors. For instance, future studies could gather data from residents or local government officers to examine the perspectives of various stakeholders within a destination. Considering the limited range of perspectives in the existing literature, future research should aim to incorporate the viewpoints of different stakeholders at various levels (e.g., property, destination) to gain a more comprehensive understanding of the impact of ICTs.

5. Conclusion

5.1. Theoretical Implications

A systematic review of the literature not only contributes to knowledge development by consolidating knowledge in a specific field but also lays the groundwork for theory development (Denyer and Tranfield, 2009; Webster and Watson, 2002). To the best of the authors' knowledge, this research represents the first attempt to synthesize studies focusing on the economic outcomes of ICTs in the tourism and hospitality industry. By systematically reviewing past literature on ICTs and their economic impacts on the tourism and hospitality industry, this

research provides a comprehensive understanding of the latest knowledge regarding the economic impacts of ICTs in this industry. Additionally, the review identified different types of economic impacts, enabling scholars in tourism and hospitality to explore potential linkages between ICTs and economic outcomes. Scholars can consider incorporating economic measures in various aspects to further assess the importance of ICTs in the tourism and hospitality industry.

Through a systematic review of 60 articles published from 2005 to 2023, this research offers an overview of how knowledge about the economic impacts of ICTs has evolved, contributing to the delineation of future research agendas — a second key contribution of this research. A close examination of the previous literature on ICTs and economic outcomes in the tourism and hospitality industry reveals a limitation in the current literature on the economic impacts of ICTs. Specifically, the findings of this research suggest that the thematic coverage of ICTs and the economic impact literature can be broadened. Furthermore, compared to other research topics related to ICTs (e.g., customer experience), the theoretical support in this area was found to be relatively weak. By identifying these gaps in the literature, this research proposes potential research directions by theme to facilitate the development of a more comprehensive understanding of tourism and hospitality technologies and their economic outcomes.

5.2. Practical Implications

The findings of this research have practical implications, as a systematic literature review provides evidence to establish practices in a specific field (Cook et al., 1997). By offering an overview of the known information on the economic outcomes of ICTs in the tourism and

hospitality industry, this research facilitates industry practitioners in staying updated on recent knowledge without the need to navigate through the overwhelming volume of research over the past two decades. This research shows that many stakeholders are involved in assessing the impact of ICTs on economic impacts: customers, employees, management, investors, destination marketing organizations, and government entities. Each stakeholder group has distinct interests, perceptions of ICTs, and definitions of economic impacts, enabling them to identify necessary information to support their decision-making processes. For instance, industry practitioners interested in understanding whether ICTs contribute to financial performance may refer to section 3.2.1.1. to learn about ICTs' contributions to financial metrics, such as sales volume, revenue, and gross operating income. In particular, general investment in ICT can benefit financial performance at destination, firm, or property levels. Notably, the influence of social media usage should be carefully planned by enhancing engagement and rating. Besides, platform and system usages can help tourism and hospitality practitioners better explore and manage revenue outlets. Similarly, when industry professionals are interested in understanding if ICTs can increase their operational efficiency, they may refer to section 3.2.2. Specifically, the industry professionals can learn (1) why ICTs can increase operational efficiency (i.e., ICTs' facilitation of internal processes) (Esparza-Aguilar et al., 2016), (2) ICTs can increase back-of-house operational efficiency by reducing the time spent on repetitive tasks (e.g., automated revenue management through ICTs) (Alrawadieh et al., 2021), by allowing employees to focus more on important tasks as ICTs can automate routine tasks (Melián-González and Bulchand-Gidumal, 2016). Industry professionals seeking to understand the impact of ICTs on a firm's market share or customer base could refer to section 3.2.3. They can delve into the market-related benefits facilitated by ICTs by examining the types of ICTs known to enhance a firm's

market share (Barman & Nath, 2019; Gholipour et al., 2022; Guedes et al., 2023; Horng et al., 2022; Liu & Shi, 2019; Zhang et al., 2021), as well as the aspects of customer behavior influenced by ICTs (Cohen & Olsen, 2013; Garrido-Moreno et al., 2018; Garriogs-Simon et al., 2017; Lee et al., 2021; Liu et al., 2022). Thus, this research can serve as a valuable reference for industry practitioners, providing insights into the economic impacts of ICTs in the tourism and hospitality industry.

5.3. Limitations and Future Research

The current research is subject to several limitations. First, the search outcomes were confined to full-length articles published in leading tourism and hospitality journals. While this research carefully selected the journals and restricted search results by considering the influence of the publications, broadening the journal coverage and incorporating other types of publications (e.g., editorials and research notes) may provide a deeper understanding of the economic impacts of ICTs in the tourism and hospitality industry than offered by the present research. Second, this research used a single database to retrieve articles of interest. Employing multiple databases may yield a greater number of articles for inclusion, thereby enhancing the breadth of coverage.

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Tables

Table 1. Number of Articles by Publication Outlets

Journal	n
International Journal of Hospitality Management	11
International Journal of Contemporary Hospitality Management	10
Tourism Economics	10
Tourism Management	7
Current Issues in Tourism	4
Asia Pacific Journal of Tourism Research	3
Journal of Hospitality and Tourism Management	3
Journal of Travel and Tourism Marketing	3
Journal of Travel Research	3
Annals of Tourism Research	1
International Journal of Tourism Research	1
Journal of Destination Marketing and Management	1
Journal of Hospitality and Tourism Research	1
Journal of Vacation Marketing	1
Tourism Management Perspectives	1
Total	60

Table 2. Number of Publications by Year

Period	n	Year	n
2000s	4	2005	3
		2009	1
2010s	28	2011	3
		2012	3
		2013	1
		2015	4
		2016	4
		2017	6
		2018	2
		2019	5
2020s	28	2020	9
		2021	10
		2022	5
		2023	4
Total			60

Table 3. Analysis of Industry Sectors

Sectors	n	%
Hotel/Lodging	23	38.3%
Tourism	23	38.3%
Multiple settings	7	11.7%
Restaurants/Foodservice	6	10.0%
Others	1	1.7%

Table 4. Summary of Methodological Approaches and Data Collection Method

Category	Subcategory	n	%
Research Methodology (n = 60)	Quantitative	52	86.7%
	Qualitative	4	6.7%
	Mixed-methods	4	6.7%
Data Collection Method (n = 60)	Secondary data	32	53.3%
	Survey	15	25.0%
	User-generated content/big data	13	21.7%
	Interview	7	11.7%
	Experiment	3	5.0%
	Others	3	5.0%

Note. Some publications used multiple data collection methods, resulting in a frequency count in more than one subcategory.

Table 5. ICTs used in Publications

Types of Technology	n	%
ICT in general	22	36.7%
Digital platforms (e.g., social media, websites)	20	33.3%
Management/operation system (e.g., accounting/revenue system, tracking)	5	8.3%
E-commerce	3	5.0%
Mobile applications	3	5.0%
Robots	2	3.3%
Others (e.g., AR, e-vehicle charging station)	5	8.3%

Table 6. Research Themes

Research Theme	Nature	Sample Publication
Impacts of ICTs on Performance		
Financial Performance	• Examined the effect of social media, regarding its effectiveness and rating, in multiple contexts. • Introduced and refined platforms and systems to enhance financial performance. • Made general ICT investment secondary data from destination, firm, or property levels.	Azevedo (2020) Esparza-Aguilar et al. (2016) Mhlanga (2022) Rehman et al., (2020) Tang, 2021 Yost et al. (2021)
Operational Performance	Strengthened operational performance via managing different perspectives of social media reviews	Kim et al. (2016) Xie et al. (2017)
Impacts of ICTs on Operational Efficiency		
Back of House Efficiency	Enhanced back-of-house efficiency derived from the implementation of ICTs, such as operation time saving, cost reduction, increased productivity	Lee & Ko (2021) Esparza-Aguilar, García-Pérez-de-Lema, & Duréndez (2016)
Impacts of ICTs on Market		
Tourism and hospitality businesses' market-related performance	Enhanced hospitality businesses' performance driven by ICTs, such as market share and online popularity.	Hao et al. (2022) Horng et al. (2022) Liu et al. (2022)
Destinations' popularity	Increased tourist arrivals of a destination by ICTs.	Guedes et al. (2023) Uyar et al. (2023) Gholipour et al. (2022)

Table 7. Summary of Potential Future Research Avenues

Research Theme	Future Study Direction
Impacts of ICTs on Performance	Studies explore other types of big data as sources of data • E.g., Unlock the potential of transaction data (e.g., credit card data) and device data (e.g., real-time GPS location data) Studies use big data to measure performance. • E.g., Measure the number of visitors using device data and the restaurant demand using transaction data. Studies examine different types of operational performance. • E.g., Assess the operational performance for human resources, finance, or maintenance department employees. Studies collect on-site data collection to address the operational performance. • E.g., Conduct field experiments and observations and refine the operational performance matrices.
Impacts of ICTs on Operational Efficiency	Studies employing longitudinal methods are recommended to investigate the impacts of ICTs on operational efficiency by time.

	• E.g., How much time has the implementation of self-service kiosks saved during the peak hours in the early stage of adoption and now? Research on customers' perceived operational efficiency derived from ICTs. • E.g., Has customers' perceived operational efficiency of food ordering increased with the introduction of tabletop tablets for food ordering? • E.g., Has customers' perceived waiting time decreased when adopting virtual queue and digital waiting list systems?
Impacts of ICTs on Market	Studies targeting various business domains, other than hotels, restaurants, and travel agencies, for examining the influence of ICTs on the market-related performance of TH companies. • E.g., Whether and how ICTs in general or specific types of ICTs affect the market-share or popularity of airlines, theme parks, and museums or galleries? Studies using various types of measurements as a proxy of a destination's market-related performance, other than its tourist arrival, for examining the influence of ICTs on the market-related performance of destinations • E.g., How does a destination's adoption of ICTs affect its tourists' overall satisfaction or perceived safety? Studies considering different stakeholders' perspectives, other than high-level executives of TH companies and visitors of destinations. • E.g., How does a TH company's usage of ICTs improve its employee's satisfaction? • E.g., How does a destination's usage of ICTs affect its resident's quality of life?

Appendix

Appendix A. Scopus Search Query

SUBJAREA (busi) AND TITLE-ABS-KEY ("Hospitality" OR "Touris*" OR "Travel" OR "Hotel" OR "Restaurant") AND TITLE-ABS-KEY ("Technolog*" OR "Robot" OR "AR" OR "VR" OR "XR" OR "MR" OR "Augmented reality" OR "Virtual reality" OR "Extended reality" OR "Mixed reality" OR "App" OR "Smart tourism" OR "Big data" OR "Artificial intelligence" OR "Self service" OR "Self-service" OR "Social media" OR "Information system" OR "Smart system" OR "Property management system" OR "PMS") AND TITLE-ABS-KEY ("Occupancy" OR "ADR" OR "RevPAR" OR "Revenue" OR "Cost*" OR "Business performance" OR "Business outcome*" OR "Financial performance" OR "Market performance" OR "Firm performance" OR "Competitive advantage*" OR "Return on investment" OR "ROI" OR "Stock-price" OR "Stock price" OR "Sales" OR "Revenue" OR "Growth" OR "Profit" OR "Market share" OR "Indices" OR "Tobin Q" OR "Arrival" OR "Pric*" OR "Economic") AND PUBYEAR > 1999 AND (LIMIT-TO (SRCTYPE , "j")) AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (EXACTSRCTITLE , "International Journal Of Contemporary Hospitality Management") OR LIMIT-TO (EXACTSRCTITLE , "Tourism Management") OR LIMIT-TO (EXACTSRCTITLE , "Journal of Hospitality Marketing and Management") OR LIMIT-TO (EXACTSRCTITLE , "Tourism Geographies") OR LIMIT-TO (EXACTSRCTITLE , "Journal Of Sustainable Tourism") OR LIMIT-TO (EXACTSRCTITLE , "Journal Of Hospitality And Tourism Management") OR LIMIT-TO (EXACTSRCTITLE , "International Journal Of Hospitality Management") OR LIMIT-TO (EXACTSRCTITLE , "Journal Of Travel Research") OR LIMIT-TO (EXACTSRCTITLE , "Tourism Management Perspectives") OR LIMIT-TO (EXACTSRCTITLE , "Journal Of Destination Marketing And Management") OR LIMIT-TO (EXACTSRCTITLE , "Journal Of Hospitality And Tourism Research") OR LIMIT-TO (EXACTSRCTITLE , "Annals Of Tourism Research") OR LIMIT-TO (EXACTSRCTITLE , "Current Issues In Tourism") OR LIMIT-TO (EXACTSRCTITLE , "Journal Of Travel And Tourism Marketing") OR LIMIT-TO (EXACTSRCTITLE , "Journal Of Vacation Marketing") OR LIMIT-TO (EXACTSRCTITLE , "Asia Pacific Journal Of Tourism Research") OR LIMIT-TO (EXACTSRCTITLE , "International Journal Of Tourism Research") OR LIMIT-TO (EXACTSRCTITLE , "Tourism Economics") OR LIMIT-TO (EXACTSRCTITLE , "Scandinavian Journal Of Hospitality And Tourism")) AND (LIMIT-TO (LANGUAGE , "English"))