

# **The future is yesterday: Use of AI-driven facial recognition to enhance value in the travel and tourism industry**

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# The future is yesterday: Use of AI-driven facial recognition to enhance value in the travel and tourism industry

## Abstract

This study aims to investigate the role of artificial intelligence (AI) driven facial recognition to enhance a value proposition by influencing different areas of services in the travel and tourism industry. We adopted semi-structured interviews to derive insights from 26 respondents. Thematic analysis reveals the development of four main themes (personalization, data-driven service offering, security and safety, and seamless payments). Further, we mapped the impact of AI- driven facial recognition to enhance value and experience for corporate guests. Findings indicate that AI-based facial recognition can facilitate the travel and tourism industry in understanding travelers' needs, optimization of service offers, and value-based services, whereas data-driven services can be realized in the form of customized trip planning, email, and calendar integration, and quick bill summarization. This contributes to strengthening the tourism literature through the lens of organizational information processing theory.

**Keywords:** Facial recognition; Artificial intelligence; Travel and tourism industry; Organizational information processing theory; Value

## 1. Introduction

In today's digital world, the safety and security of data, customers, and their assets play a critical role in businesses. Therefore, personal identification is important (Culot et al., 2019; Martínez et al., 2013). Given that people recognize each other by face, using technologies to recognize facial features is sensible (Bromberg et al., 2020). However, few biometric technologies are have a facial recognition capacity (Watts, 2019). Facial recognition technology operates within the boundaries of safety measures and regulatory requirements. Facial recognition-based identification follows a structured process of (i) *face detection to locate the human in images and videos*; (ii) *face capture to process analog information into digital data using facial features*; and (iii) *face matching for verification of identity* (Sun et al., 2018) to avoid events such as theft, rioting, and robbery, etc. Facial recognition is employed across sectors from healthcare and the retail sector to defense and government. For instance, some healthcare organizations use such technology to enable touch-free healthcare processes, including appointment check-in and

assistance with diagnosis (Katsanis et al., 2021). As another example, police use this technology to catch suspected criminals (Hofmann, 2020; Moraes et al., 2021). Governments use facial recognition to process travelers at border crossings to avoid threats and improve surveillance (Almeida et al., 2021). These technologies work on the principles of integrating and analyzing the digital image or video frame of a face relative to a dataset, matching the features and/or texture of skin (Andrejevic & Selwyn, 2020; Kotsia & Pitas, 2006; Wang et al., 2021). To date, facial recognition has been used in several areas: where Facebook uses facial recognition to identify human faces through digital images (Norval & Prasopoulou, 2017), Apple uses the Face ID system to authenticate users and to prevent unauthorized access (Bud, 2018). Apart from companies, researchers at China University of Hong Kong developed a facial recognition technology in 2014 with an identification score of 98.52% compared to humans' 97.53% (Thales, 2020).

An AI-based facial recognition system can be utilized to verify and identify a person quickly (Akhtar et al., 2020). Identification helps in knowing "*who are you,*" whereas verification answers "*are you the one who you claim to be?*" (Wang et al., 2018; Whitley et al., 2014). This intelligent system of facial biometric AI can recognize individuals in seconds, describing facial features such as the contour of lips, ears, chin, the space between the eyes, the distance between the eyes and mouth, and nose length (González-Rodríguez et al., 2020; Solanki & Pittalia, 2016). Other forms of the recognition are fingerprints, the voice, vein geometry, iris scans, or other behavioral characteristics (Jain et al., 2000; Watts, 2019). However, facial recognition continues to be the preferred system because of its easy deployment and wide coverage in large populations, even crowds (Andrejevic & Selwyn, 2020; Bromberg et al., 2020; Shi et al., 2020; Sigala, 2012; Yang et al., 2017).

Facial recognition technology is explored and used often in the travel and tourism industry, where information processing needs to be quick (González-Rodríguez et al., 2020; Murphy et al., 2016). The technology is useful for tourism organizations that deal with large volume of travelers, so that travelers can be processed in a particular service set-up safely and quickly. The service set-ups range from airports to trains and hotels, where safety and security are a key concern. Hence, AI-supported facial recognition can help recognize and verify people, granting access to verified individuals while keeping others out (Alptekin & Büyüközkan, 2011; Samala et al., 2020). The speed of identifying, recognising, capturing, and verifying further enhances the customer's experience through personalization (Lee et al., 2011; Zhang et al., 2020). These characteristics of biometric AI enable the system to

auto-learn from the data and enhance the information processing capabilities of an organization (Jun & Vogt, 2013). Therefore, these capabilities of facial biometric AI can support the prevention of identification (ID) fraud and theft (Kaplan & Haenlein, 2019; Mahmoudi & Duman, 2015). In tourism, as international travelers cross borders, the description in digitized biometric passports can be compared with the original face. This technique can be further integrated with automated control gates at train stations and airports, since these are the last spots to stop a fake person (González-Rodríguez et al., 2020). Apart from travel and tourism, effective information processing driven by facial biometric AI plays a critical role in law enforcement, such as in police checks, finding missing people, tracking criminals, and expediting investigation (Bromberg et al., 2020).

Facial recognition is an emerging topic of research and development in the developing and developed worlds. For instance, China is developing a sunglasses program for police to identify people in the wrong (Turchin, 2018). Biometric-driven AI can help recognize authorized persons and viewers and grant them automatic access (del Rio et al., 2016; Chan & Lam, 2013). In Australia, trials are ongoing for the use of facial biometric AI to expedite security checks at airports (Bromberg et al., 2020). In India, the Aadhar Project has rolled out facial authentication, which would be phased in from 2020 onward (Mir et al., 2020). Through AI-based facial recognition, guests will be able to check in quickly and effortlessly in hotels and airports without waiting for a staff member to help them do so (González-Rodríguez et al., 2020; Jun & Vogt, 2013; Xu et al., 2021). In airports, AI-driven facial recognition can contribute to the environment by avoiding the use of paper-based boarding passes (Bromberg et al., 2020). On the one hand, the use of AI-driven technologies enable strong organizational processing capabilities (Dwivedi et al., 2019). On the other, they save businesses time and money by eliminating potential errors. AI-supported facial recognition can help eliminate friction from purchases and ensure seamless interaction between organizations and consumers resulting in a memorable experience (Lehrer et al., 2018). Studies have focused on either email-based communication or remote check-in systems in travel and tourism despite the need for authentication. For instance, Chang and Yang (2008) advocated the need for self check-in kiosks at airports for enhancing tourist experience, but studies do not explore the security aspect while travelling. In addition, Shin et al. (2019) highlighted the innovation in front desk technologies to offer customized services, but their study focused only on the experience of a guest after their arrival at hotel. Other studies emphasize message-based platforms intended to either ensure guest satisfaction or market a destination (Wang et al., 2017). Personalization, data-driven service excellence, multi-

layered security, and seamless payment experience remain prevailing concerns in the travel and tourism industry, especially when it comes to business travelers and hence role of AI can be explored, making their stay comfortable (Han et al., 2021). Therefore, to fill these gaps, our study focuses on potential and current applications of AI-driven facial recognition technology in the travel and tourism industry. Hence, this study aims to address the following research question: *In what ways can AI-driven facial recognition help the travel and tourism industry?*

To answer this research question, this study adopted a qualitative approach through semi-structured interviews and thematic analysis to classify the key themes. This study contributes to strengthening and extending tourism literature through an Organizational Information Processing Theory (OIPT) lens. The study mapped the influence of AI-based facial recognition relating to personalized service delivery, traveler convenience, and benefit to the travel and tourism industry. The study develops four unique themes that present the potential applications of AI-based facial recognition technology. Finally, the study highlights the fundamental role of AI-based facial recognition in processing information for personalized data-driven service excellence, enhanced security, and seamless payments in travel and tourism.

The remainder of the paper is organized into five sections. Section 2 discusses the literature, followed by our research methods in Section 3. Section 4 presents the findings, which we discuss in Section 5, along with the implications for theory and practice and the limitations of the study. We conclude in Section 6.

## **2. Literature review**

### *2.1 Travel and tourism industry*

The three industries *viz.* tourism, travel, and hospitality largely represent enterprises with one common goal: to provide both necessary and customized services to travelers (O'Grady et al., 2009; Zatori et al., 2018). For most services, enterprises need to process a wide variety of information to run accommodation operations (e.g., hotel, motels, casinos, and conference centers), transportation services (e.g., airplanes, cruise, ships, and buses), food and beverage operations (e.g., catering, bats, vending machines, and banquets), retail stores (e.g., souvenirs, handicrafts, and gift shops), and other activities ranging from recreation to sporting occasions or ethnic festivals (Kim et al., 2016; Zhang et al., 2018). The travel industry covers both short and long distance and domestic and overseas travel with varied objectives. The travel industry acts as an enabler not only to reach a destination, but also to encourage

travelers to explore the destination (Bromberg et al., 2020; González-Rodríguez et al., 2020). Various stakeholders are further involved in supporting the travel industry – e.g., healthcare (Nasseef et al., 2021), security (Chiu et al., 2009), or return travel – processing much information to achieve effectiveness in their operational activities. For instance, travel agents, online travel agencies, tour operators, and regional tourism organizations help the industry indirectly in ways that facilitate tourists in choosing different combinations such as combination of air travel, accommodation, hotel transfer, and sightseeing (Gaur et al., 2021). Doing so presents an opportunity for each party to adopt breakthrough technologies (Xu et al., 2021). In addition, the industry addresses numerous other issues such as infrastructure, transparency, security, and safety. The last three – transparency, security, and safety – can be dealt with by AI-driven facial recognition. Another challenge for small and medium enterprises in the industry is to maintain an adequate service level, whereas on the other hand workforce quickly shift jobs. Therefore, it is critical to examine how AI-driven facial recognition can facilitate the experience and value proposition in travel and tourism industry.

## *2.2 AI driven facial recognition*

The AI-driven facial recognition system recognizes a person on the basis of an image or video (González-Rodríguez et al., 2020). The technology has existed for decades, but has only recently gained popularity and become accessible. It functions by identifying a personal photo through a secondary authentication application in remote and mobile devices (Samala et al., 2020; Xue et al., 2020). The AI-driven facial recognition system is capable of processing information to detect the visual geometry of individual facial expressions. Geometry-based attributes can help enterprises, police, and consumers search through the huge metadata to identify a person from a source or a unique identifier (Koo et al., 2016; Wang et al., 2018; Whitley et al., 2014). AI-based facial recognition is applied in areas such as media and entertainment for indexing images and videos in non-government organizations or humanitarian organizations working to rescue human trafficking victims (Kaplan & Haenlein, 2019; Traore et al., 2018). Moreover, banking and travel companies have been adopting technologies to avoid any human intervention in their operations and enhance the security of their services (Fang et al., 2014). The simple use of AI-driven facial recognition on the basis of information processing helps access details regarding concerns and issues such as public safety or law enforcement (Chan & Lam, 2013; del Rio et al., 2016).

### 2.3 Organizational information processing theory

OIPT advocates that an enterprise should organize and make use of information efficiently while operating interdependently and within a certain time period (Galbraith, 1973). The theory focuses on three aspects (i) *the information processing requirement*; (ii) *the infrastructure's capability of processing the information in the ecosystem*; and (iii) *the capacity requirement and capabilities to achieve optimal performance* (Srinivasan & Swink, 2018; Tenhiälä et al., 2018). Given that the inherent complexities and uncertainties in the travel and tourism industry have increased due to Covid-19, the quality of information in terms of smart AI-driven facial recognition can play a critical role in coping with environmental dynamism and improving related decisions to ensure a positive tourist experience (Gaur et al., 2021; Zatori et al., 2018). Facial recognition has the potential to ensure a hassle-free service experience in many aspects of the travel and tourism industry. In general, enterprises either create a buffer to reduce the impact of complexity or apply a structural mechanism to enhance the information flow (de Guinea & Webster, 2017; Haußmann et al., 2012; Umar, 2005). Today, many enterprises opt for a structural mechanism over the buffer to avoid costs. The structural mechanism in the form of intelligent systems for facial recognition can help improve information and tourist flow in the travel industry (Awad & Krishnan, 2006; Azadegan et al., 2020).

### 2.4 AI in the travel and tourism industry

The travel and tourism industry has realized the need for authenticating identity prior granting access to travel and accommodation related facilities (González-Rodríguez et al., 2020; Samala et al., 2020). Such authentication helps enterprises offer exciting and memorable service experiences with courteous interaction (Zatori et al., 2018). The authentication system further supports the security of staff and society (Chan & Lam 2013; del Rio et al., 2016; Fang et al., 2014). The travel and tourism industry has tried a number of applications from self-service kiosks to message-based platforms to remote check-in systems, yet authentication bottlenecks exist and lead to unsatisfied guests, thus creating service gaps (Chang & Yang, 2008; Gavett, 2015; Watts, 2019), constituting the rationale for this study. Among these applications, facial recognition stands out due to its capability of quick information processing and accuracy, along with minimal security risk (Thales, 2020). AI-enabled biometric facial recognition can help improve customization for travelers (Collins et al., 2021). For instance, hotels can have the option of uploading a customer's photograph during the process of booking, and the photograph can be integrated with the airline booking and on-arrival services to further enhance the traveler's experience (Buhalis et al., 2019; Chiu et al., 2009; Lehrer et al.,

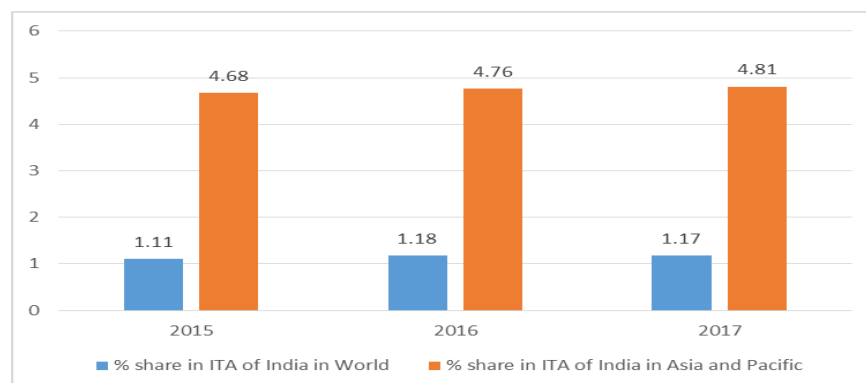
2018). Matching a photo or a video from a database can help hotel staff recognize a repeat customer, and services can be tailored accordingly to provide the best experience during their stay (Gaur et al., 2021; Lehrer et al., 2018). Hotel rooms can be automatically set to a preferred temperature according to a recognized pattern, and meals can be pre-ordered based on preferences (Zhang et al., 2020). Another feature of AI-driven facial recognition is the security and safety of processing information with different partners, such as an insurer for a particular visit (Bromberg et al., 2020). Additionally, the technology can be used to prevent crime or recognize suspicious travelers (Culot et al., 2019; del Rio et al., 2016). In this way, the hotel security staff can occasionally cover areas that CCTV systems cannot, and alert security personnel can help to identify suspects instantly whereas CCTVs cannot (Chan & Lam, 2013). The travel industry is highly dynamic and works on the principle of the experience economy, therefore, analyzing each and every act of a guest's experience is crucial to designing their processes and services (Zatori et al., 2018). In this view, AI-driven facial recognition can help view demographic to psychographic features of guests and can be communicated to different locations during their journey to enable providers to create excellent services (Buhalis et al., 2019).

AI-supported facial recognition technology can also play a critical role in authorizing payments seamlessly and swiftly (Mahmoudi & Duman, 2015). It offers payment solutions in different scenarios, such as check-out without interacting with staff or front office and automatic payment at restaurants (Ciftci et al., 2021; González-Rodríguez et al., 2020; Zhong et al., 2021). Hotels, through advanced AI-driven facial recognition, can identify images, sounds, and services that can appeal to traveler profiles. Therefore, the travel and tourism industry can build the psychological profile of a traveler and match their range of offerings to the traveler in question (Arenas et al., 2019; Samala et al., 2020).

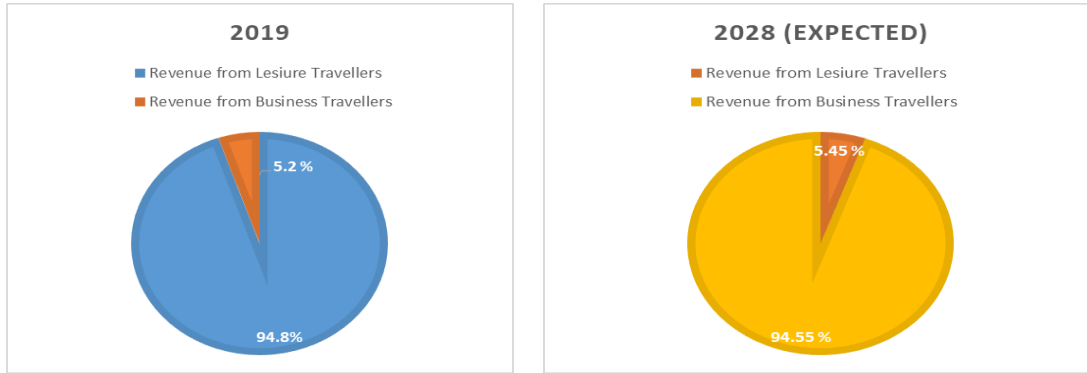
Furthermore, the adoption of AI-based recognition technology offers social, economic, and environmental benefits to organizations in the travel and tourism industry (Arenas et al., 2019; Bednar & Welch, 2020; Xue et al., 2020). Enterprises can do away with the conventional approach of documentation. Airports are utilizing this technology to process travelers 40% faster (del Rio et al., 2016), and the Marriott Hotel in China has reduced the check-in time from three to one minute (Buhalis et al., 2019). Royal Caribbean (cruise sector) has also employed the facial recognition technology to reduce processing time significantly compared with the conventional approach of customs clearance (Lu et al., 2019). The technology can also be used for pre-booking cars or minicabs onboard



(Lehe, 2019). Therefore, the application of AI driven facial recognition technology can significantly help customs, hotels, airports, and immigration (Kim et al., 2016; Murphy et al., 2016). The traditional documentation process of customs clearance and immigration consumes a large amount of time, which frustrates tourists. Apart from using facial recognition for tourists, many enterprises, including travel and tourism, use it for other stakeholder purposes, such as tracking the number of employees and contractors to maintain service levels (Zatori et al., 2018). This AI-led innovation eases the work of payroll officers by monitoring attendance in real time and prevents queuing in time office, which is usually followed in the traditional attendance system (Andrejevic & Selwyn, 2020). In the near future, AI-driven facial recognition can be extended to cars and other vehicles, a critical mode of travel in the travel industry. The AI-based facial recognition system will make modes of travel (cars, airplanes, or ships) more secure in terms of driving, parking, locking, and unlocking vehicles (del Rio et al., 2016; Lu et al., 2019). Through AI-supported facial recognition, blink rate detection can help prevent accidents during travel because it can monitor and track the signs of driver drowsiness (Yang et al., 2020). Existing studies discuss service provision in terms of physical kiosks, document scanning, and self-check-in and check-out in the travel and tourism industry, but they lack the key highlights that can bring the paradigm shift in the travel and tourism industry. Building upon the above exciting applications of AI-driven facial technology in the travel and tourism industry, our study analyses travelers' experiences to redesign existing and future travel services. This study has been undertaken in India, because of its steadily increasing percentage share in international tourist arrivals in Asia Pacific and in the world regularly in recent years, as indicated in Figure 1. Figure 2 highlights the maximum expected shift of revenue source from leisure to business travel in future. Therefore, strengthening the travel and tourism sectors with AI-based facial recognition technologies would be appropriate to offer seamless experiences to business travelers.



**Figure 1.** Percentage share of India in the world and in the Asia and Pacific region (Source: Ministry of Tourism, Government of India, 2018)



**Figure 2.** Expected segment-wise revenue share shift from leisure to business travelers by 2028 (Source: India Brand Equity Foundation, 2020)

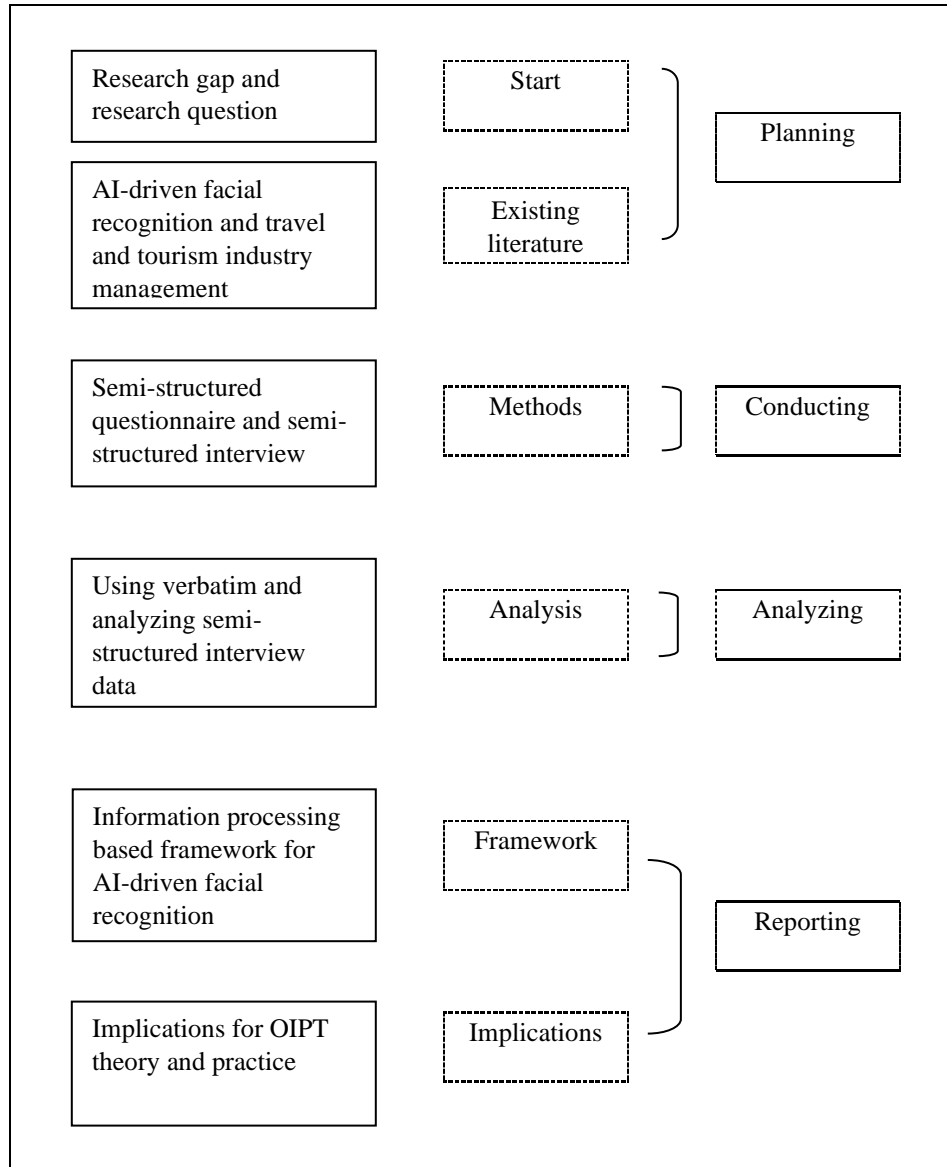
### 3. Research Methods

#### 3.1. Qualitative research

This study adopted a qualitative approach using semi-structured interviews. Qualitative study is helpful in answering questions that are difficult for quantitative methods to resolve (Savin-Baden & Major, 2013). Qualitative study can be considered a first step in identifying variables that can be later analysed quantitatively, or if quantitative measures cannot present the appropriate description (Firestone, 1993; Marshall & Rossman, 2014). The literature indicates diverse qualitative methods ranging from unstructured to semi-structured. Keeping in mind the exploratory nature of the present study, we adopted a grounded theory approach.

Grounded theory helps researchers identify and extract meaningful categories from collected data (Birks & Mills, 2015). As a method, it enables categorization, and as a theory, it works as a product (Strübing, 2014). Therefore, grounded theory presents a process that can help researchers identify data from multiple directions to develop the links to finalize relationships among different themes. Further, it helps researchers develop propositions or frameworks that can be viewed as phenomenon under investigation. Researchers use different ways to recognise, refine, analyse, and develop the relationships among variables. The literature shows the adoption of case analysis,

content analysis, and theoretical sampling through coding (Charmaz & Belgrave, 2012). We adopted cross-variable analysis and thematic analysis by using a coding approach. We have adopted a four-step methodology to conduct this study – planning, conducting, analyzing, and reporting – as indicated in Figure 3.



**Figure 3.** Research investigation framework

### *3.2. Interview process and data collection*

We intended originally to conduct face-to-face interviews in this study, but due to the COVID-19 pandemic, we collected the data through an online questionnaire. Study took utmost care and follow-ups while conducting, collecting and analyzing the data. This study targeted corporate/business travelers due to their high profile and industry push to offer great experiences to them. Our respondents hold key positions in their organizations, ranging from managers and engineers to director or founders of organizations in India. The selected respondents had at least three years of travel experience in due to their jobs, staying in three- and five-star hotels for business travel. We developed our semi-structured questions on the basis of the existing literature. Before finalizing our questions, we refined them in two revisions in consultation with two academicians and two practitioners working in travel agencies. We kept our questions open-ended to obtain the maximum input which can be used to derive meaningful insights (Marshall & Rossman, 2014; Charmaz & Belgrave, 2012). To reduce bias before and during the interview, and during data analysis, this study took certain precautions such as keeping the questions generic at first, followed by specific questions. During the interview process, we took care to not influence the thinking or answer style of the respondents, and during the analysis process, we considered all the data points to evaluate all the responses with an open mind.

We used purposive and snowball sampling in this study. While conducting online interviews, we followed a three-step approach (i) initiating the conversation with the reference and objective of the study; (ii) understanding the individual's experience of the travel and tourism industry; and (iii) interviewing the respondent with semi-structured questions while keeping OIPT view in mind. The responses were collected from the high-profile respondents during March, April, and May 2020, and each interview lasted for 40 to 45 minutes. Out of 26 respondents, three respondents had rescheduled their interview dates twice, and two had rescheduled once. These changes were held after a gap of one week due to their work commitments. Table 1 shows the semi-structured questions for interviewees.

**Table 1.** Semi-structured interview questions

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1. As a traveler, do you think that emerging technologies like Artificial Intelligence (AI) enhance the comfort, convenience, and loyalty of a traveler?
  2. As a traveler, would you prefer the use of facial recognition technology rather than waiting in a queue for physical check-in at a hotel?
  3. While travelling, do you think that AI-supported facial recognition technology can replace boarding passes in airports?
  4. What is your view on adopting AI-enabled technology to enhance security, convenience, privacy, and personalization vis-à-vis the traditional system of identification in the tourism industry?
  5. How comfortable are you with human–machine interaction compared with human–human interaction in the travel and tourism industry?
  6. In your opinion, how do emerging technologies like AI-supported facial recognition can help in multiple and faster transactions made by a traveler during a visit?
  7. What is your opinion on reducing human–human interactions through use of AI-based technologies to facilitate norms such as social distancing during pandemic scenarios in travel and tourism industry?
  8. Although we count on the advantages of adopting emerging technologies like AI, concerns such as privacy and emotional understanding arise for a traveler. What is your opinion on this?
- 

### *3.3. Data processing*

To conduct the thematic analysis, refinement and transcription was done where it was needed. A spreadsheet was developed consisting responses of 26 participants. Cross categorization and multiple reviews helped us to identify the themes and sub-themes. If a disagreement arose in identifying themes and sub-themes, we employed a third person who is familiar with the travel and tourism industry. To check if all sub-themes are included in the theme, we cross-checked with the existing responses. Axial coding was employed to recognise the relationships among themes and sub-themes (Huang et al., 2014). Approach of triangulation was adopted to ensure validity of these relationships by comparing the data collected to secondary documents available from different forums of people working in the travel and tourism domain (Wilson & Hutchinson, 1991). Finally, themes, subthemes, and categories together were viewed to develop the propositions and a framework, which can be helpful to advance AI-inspired facial recognition in the travel and tourism industry. Utmost care of consistency was undertaken while collecting and recording the data, and that we further confirmed the intended meaning of the respondent by

reviewing each line of the response. All responses were checked for the reason of understanding and internalizing the same context penned by respondents.

## **4. Findings**

### *4.1 Features of respondents*

After contacting approximately 52 individuals who were frequent flyers, we were able to finalise the list of 31 respondents who agreed to take part in the interview process spread over a time period of three months. However, five respondents later refused to participate in the interview process due to various reasons associated with their schedule of business activities. Out of 26 respondents, five belong to the category of directors and founders, whereas 10 belong to the role of managers and senior managers followed by five from the domain of engineering. Remaining respondents belong to AVPs (Assistant Vice President), consultants, and sales executives, as indicated in Table 2.

Apart from distinctive features of respondents, characteristics of firms were captured which they belong to. Table 3 indicate that approximately 42% of the respondents have more than 10 years of professional experience, and 63% of those belong to companies with more than US\$ 500 million of turnover in the last year. Moreover, 61% of respondents belong to companies with more than 1,000 employees, which indicates the complexity of their business operations.

### *4.2 Themes and sub-themes*

Business executives play an important role as a consumer for travel and tourism organizations, because they frequently participate in events held abroad and corporate activities in multinational locale. The following sub-sections discuss the four main themes identified from twelve sub-themes.

#### *4.2.1 Personalization*

Building on the observations from 26 interviews, most respondents highlighted the role of AI-driven facial recognition for personalised services, which can bring productivity in travel and tourism firms, as well as executives who are travelling for a particular reason (Respondent 4: a 37-year-old founder with around 9 years of experience in IT services/software industry; Respondent 8: a 37-year-old manager with more than 10 years of experience in the consulting domain).

#### 4.2.1.1 Traveler needs

After identification of a traveler, the next step for any company is to understand the needs of an individual or a group who is going to travel. The needs of travelers may range from a type of taxi required to reach the airport from the hotel or vice versa, fast internet connection in a hotel room, to clarifying the meeting agenda and other business requirements (Chang & Jung, 2017; Lehe, 2019). Therefore, stakeholders such as travel agencies, airlines, hotels, or travel insurance companies need close coordination to understand the traveler needs and offer appropriate solutions. For understanding traveler needs, facial recognition can play an important role as indicated by respondent 3 (a 38-year-old senior manager with more than 10 years of experience in manufacturing industry): *“mostly in business travel we are in a hurry and have less time for mandatory requirements such as getting the boarding pass or check-in at hotels. Facial recognition can help facilitate the fast check-in requirement of people like us.”*

**Table 2.** Interviewees' profiles

| Position                              | Age       | Education              | Occupation                |            |                     |             |                     |                       | Total |                            |                |
|---------------------------------------|-----------|------------------------|---------------------------|------------|---------------------|-------------|---------------------|-----------------------|-------|----------------------------|----------------|
|                                       |           |                        | Construction /real estate | Consulting | Education/ research | Gover nment | Human resource (HR) | IT services/ software |       | Logistics and supply chain | Manufa cturing |
| <b>Director/<br/>CXO/<br/>Founder</b> | 31–<br>40 | Post-graduate          |                           |            |                     |             |                     | 1                     |       | 1                          |                |
|                                       | 41–<br>50 | Post-graduate<br>Ph.D. |                           |            | 1                   |             |                     |                       | 1     | 1                          |                |
| <b>AVP/VP/EV<br/>P</b>                | 41–<br>50 | Graduate               |                           |            |                     |             |                     | 1                     |       | 1                          |                |
| <b>Consultant</b>                     | 41–<br>50 | Post-graduate          |                           |            |                     |             |                     |                       | 1     | 1                          |                |
| <b>Manager/Sr.<br/>Manager</b>        | 20–<br>30 | Graduate               |                           |            |                     |             |                     |                       |       | 3                          |                |
|                                       |           | Post-graduate          |                           |            |                     |             |                     |                       |       | 1                          |                |
|                                       | 31–<br>40 | Graduate               |                           |            |                     |             |                     | 1                     |       | 1                          |                |
|                                       |           | Post-graduate          |                           | 1          |                     | 1           |                     | 1                     | 1     | 1                          | 5              |
|                                       | 41–<br>50 | Post-graduate          | 1                         |            |                     |             | 1                   | 1                     |       |                            | 3              |
| <b>Engineer</b>                       | 20–<br>30 | Graduate               |                           |            |                     |             |                     | 1                     |       | 1                          | 2              |
|                                       | 31–<br>40 | Graduate               |                           |            |                     |             |                     | 1                     |       |                            | 1              |
|                                       |           | Post-graduate          |                           |            |                     |             |                     | 1                     |       |                            | 1              |
|                                       | 51–<br>60 | Post-graduate          | 1                         |            |                     |             |                     |                       |       |                            | 1              |
| <b>Sales/market<br/>ing executive</b> | 20–<br>30 | Post-graduate          |                           | 1          |                     |             |                     |                       |       |                            | 1              |
| <b>Total</b>                          |           |                        | 2                         | 2          | 1                   | 1           | 1                   | 9                     | 2     | 8                          | 26             |



**Table 3.** Number of employees in the company vs. annual turnover/revenue of the company

| Number of employees in company | Total work experience | Annual turnover/revenue of company (2018–2019) |                   |                   |                    |                     |                      | Total |
|--------------------------------|-----------------------|--|-------------------|-------------------|--------------------|---------------------|----------------------|-------|
|                                |                       | Below 10 million USD                           | 10–25 million USD | 26–50 million USD | 76–100 million USD | 251–500 million USD | Over 501 million USD |       |
| <b>Less than 10</b>            | Less than 1 year      | 1  |                   |                   |                    |                     |                      | 1     |
| <b>10–50</b>                   | More than 10 years    |  |                   |                   |                    |                     | 1                    | 1     |
| <b>50–300</b>                  | 5–10 years            | 2  |                   | 1                 | 1                  |                     |                      | 4     |
|                                | More than 10 years    | 2  |                   |                   |                    |                     |                      | 2     |
| <b>500–1,000</b>               | 1–3 years             |  |                   | 1                 |                    |                     |                      | 1     |
|                                | More than 10 years    |  |                   |                   |                    |                     | 1                    | 1     |
| <b>More than 1,000</b>         | Less than 1 year      |  |                   |                   | 1                  |                     |                      | 1     |
|                                | 1–3 years             |  |                   | 1                 |                    | 1                   |                      | 2     |
|                                | 3–5 years             |  | 1                 |                   |                    |                     | 1                    | 2     |
|                                | More than 10 years    | 1  |                   |                   | 1                  | 2                   | 7                    | 11    |
| <b>Total</b>                   |                       | 6  | 1                 | 3                 | 3                  | 3                   | 10                   | 26    |

Another respondent highlighted the need to carry documents and proof of identity, “*Most of the time, there is a significant delay due to lot of manual work for check-in purpose such as scanning of documents, taking the photographs, biometrics, filling up the forms. If all these activities can be automated through systems such as face recognition technology, it shall be a most welcome step*” (Respondent 24: a 48-year-old director with more than 10 years of experience in the manufacturing industry).

#### 4.2.1.2 Specific offers

Using AI-driven facial recognition helps to identify guests’ characteristics, which can help tailor different services that travelers may prefer (Gaur et al., 2021). Facial recognition can aid in recognising if the guest is food focused or eco-friendly. These clues can help design specific offers to suit the motives and needs of travelers (González-Rodríguez et al., 2020). One respondent pointed out that an “*AI-based system of recognition should be intelligent enough; if I have chosen for [an] air booking with digital, or pay partially, or pay later payment, then the*

*same options should automatically be offered in other transactions ranging from [a] hotel booking to a local travel around the destination”* (Respondent 23: a 46-year-old chief technology officer with more than 10 years of experience in the IT services/software industry).

#### 4.2.1.3 Value-based services

AI-based facial recognition represents a paradigm shift in the travel and tourism industry by measuring tourists’ needs and satisfaction and offering value-driven services (Enholm et al., 2021). Emotions can be captured through facial recognition to determine deficiencies in services and enhance the degree of value provided to the traveler. A respondent noted that *“tour and travel operators need to implement specific artificial intelligence that will add value to the customer experience with their brand”* (Respondent 19: a 25-year-old manager with around one year of experience in the manufacturing industry). Therefore, flexibility with the type of AI (narrow, general, or strong) can be used to enhance the customer experience through the right mix of value proposition (Zatori et al., 2018). In this context, one respondent shared that *“we all have seen the replacement of tickets with our mobile phones. I see the value of AI-based facial recognition if it can eliminate the checking of ID and ticket at gate, security, immigration, and boarding points”* (Respondent 7: a 29-year-old sales executive with around five years of experience in consulting).

#### 4.2.2 Data-driven service offering

AI-driven facial recognition, with its numerous data, can facilitate travel and tourism firms to make informed decisions through data analytics (Nasseef et al., 2021; Sahay et al., 2021). Data analytics will enable organizations to offer the best services in trip planning and execution (Duan et al., 2019; Kar & Kushwaha, 2021; Lehrer et al., 2018): *“The appropriate data-driven system around service excellence can help increase the productivity and quality of services offered”* (Respondent 15: a 43-year-old senior manager with more than 10 years of experience in the human resources industry).

##### 4.2.2.1 Optimal and customised trip planning

Facial recognition technology helps store information on individual tastes and preferences (Murphy et al., 2016). This advantage can help customise the planning of a trip. Facial recognition can identify business or personal needs and help different organizations involved in planning. Respondent 26 (a 45-year-old senior manager with

more than 10 years of experience in the IT services/software industry) remarked how facial recognition can help ease the fear of losing one's ID and boarding pass: the *"cost of missing boarding pass and identification proof is very high. If the travel is for multiple places and multiple travelers, then the risk is high and the headache to keep the documents can be avoided by using AI-based facial identification."* The technology can also help quickly process guests in peak seasons like the Christmas and New Year holidays and offer seamless service (He et al., 2014). In the case of business travelers, facial recognition technology can help execute the plan in a timely manner. A respondent noted benefits such as *"timely services, less disturbance and adherence to the plan. In this case, the uses of AI-based facial recognition technologies to provide these KPIs (key performance indicators) will be very useful. It shall reduce the chances of error which is induced due to human mental conditions (working hours, family situation, financial issues.)"* (Respondent 24: a 48-year-old director with more than 10 years of experience in the manufacturing industry).

#### 4.2.2.2 Integrating email and calendar for updates

Due to their busy schedule, business travelers have difficulty in tracking updates on their travel plan and the status of their booking if a flight has been delayed or not; hence, such arrangements must have been made or scheduled from the office (for business travelers). One respondent said *"I would like to see the outcome of facial recognition in terms of integrating my calendar with the booking and building the travel itinerary for me"* (Respondent 12: a 33-year-old engineer with approximately eight years of experience in the IT services/software industry). Furthermore, the AI system can predict flights delays, which are typically caused by bad weather or political unrest in the destination (Alptekin & Büyüközkan, 2011; Turchin, 2018). AI can notify travelers about the origin and destination conditions. Respondent 8 (a 37-year-old manager with more than 10 years of experience in consulting) noted that *"I would expect the intelligent system of facial recognition to send the timely notification about the flight departure time and weather prediction for the next few days to enable me to make decisions in real time."*

#### 4.2.2.3 Quick bill summarization

In the travel and tourism industry, mapping the consumption patterns of a guest is crucial so that an accurate bill can be generated at the end of the journey or when the guest is about to pay. AI-based facial recognition can

facilitate the system of a hotel or a travel agency to compute the total amount of expenses incurred by a guest; the system can come attached with the traveler's photograph (Kaplan & Haenlein, 2019). Business travelers often need to leave for a business meeting or return to their offices; hence, a system that can process information in real time is important for them (del Rio et al., 2016). One respondent who once needed to wait for clearance of a bill pointed out, *"the AI-based recognition system can help the staff accumulate and generate the bill on a real-time basis when required"* (Respondent 22: a 35-year-old engineer with approximately 8 years of experience in the IT services/software industry).

#### 4.2.3 *Enhanced safety and security*

AI-based facial recognition can be utilised to verify a traveler's identity in airports, to follow customs department requirements, and for protect international borders. *"Safety and security aspects can facilitate the travel and tourism industry in multiple ways"* (Respondent 6: a 47-year-old consultant with more than 10 years of experience in the logistics and supply chain domain).

##### 4.2.3.1 *Access to different facilities*

The technology can be used to control the access to guests to certain amenities, ranging from the gym to the snooker room (Gaur et al., 2021). One respondent emphasised that *"since airports and hotels are two critical platforms in the travel and tourism industry, they can [...] immensely benefit from the facial recognition technology by identifying safety threats and limiting access to sensitive zones"* (Respondent 20: a 27-year-old assistant manager with approximately three years of experience in the manufacturing industry). Hence, Facial recognition technology provides several types of control to different organizations organizations.

##### 4.2.3.2 *Tracking history*

In today's era of crime and the COVID-19 pandemic, firms in the travel and tourism industry must keep keep track of travelers' characteristics, and this task is very much possible through AI-backed facial recognition (Gaur et al., 2021; Watts, 2019; Yang et al., 2020). One of the respondents highlighted that *"in scenarios like [the] pandemic, these solutions can be very useful and can rekindle the tourism industry. AI-based facial recognition can aid in tracing travel history, which would be helpful to prevent any mass spread of COVID-19"* (Respondent 25: a 28-year-old assistant manager with approximately three years of experience in the manufacturing industry). Another

respondent advocates that the technology can help economies that rely heavily on tourism: *“AI-driven technology can impact the countries/regions dependent on tourism with [a] government push toward it”* (Respondent 23: a 46-year-old chief technology officer with more than 10 years of experience in the IT services/software industry).

#### 4.2.3.3 *Management options for troublesome guests*

The comfort of a traveler is dependent on the behavior of co-travelers (Bromberg et al., 2020; Culot et al., 2019). Hence, organizations need a system for character identification to ensure safe and comfortable experiences for all. One respondent highlighted that the *“handling of large number[s] of travelers at multiple locations is not an easy task, and bad characters can be a threat to the security system. Once data is linked with the facial recognition technology, it will be easy to tackle the troublesome travelers”* (Respondent 5: a 45-year-old chief experience officer with more than 10 years of experience in the manufacturing industry).

#### 4.2.4 *Seamless financial transactions*

In services like travel and tourism, the payment system is a core element of the overall experience (Zhong et al., 2021). *“Apart from the physical features of the travel experience, guests gauge the service quality on the basis of the platform that supports payments swiftly and seamlessly”* (Respondent 18: a 28-year-old manager with approximately three years of experience in the manufacturing industry).

##### 4.2.4.1 *Speedy transactions*

The travel and tourism experience is judged on speed, the seamlessness of a service, and its reliability (Mahmoudi & Duman, 2015). The same applies to financial transactions, they should be efficient and secure. Respondent 25 (a 28-year-old assistant manager with approximately three years of experience in the manufacturing industry) noted that *“the platforms embedded with enough cyber security, encryption, and anomaly detection can facilitate the transactions event faster than UPI (unified payments interface).”* Financial transactions can also be designed to reduce the involvement of multiple stakeholders compared with the traditional transaction methods. A respondent highlighted that *“AI technologies can further increase transaction speeds by reducing the need for human input, and banks can automate payment workflows by applying image recognition to financial documents and using natural language processing to support payments via voice assistants”* (Respondent 19: a 25-year-old manager with approximately one year of experience in the manufacturing industry).

#### 4.2.4.2 Tracking consumer spending

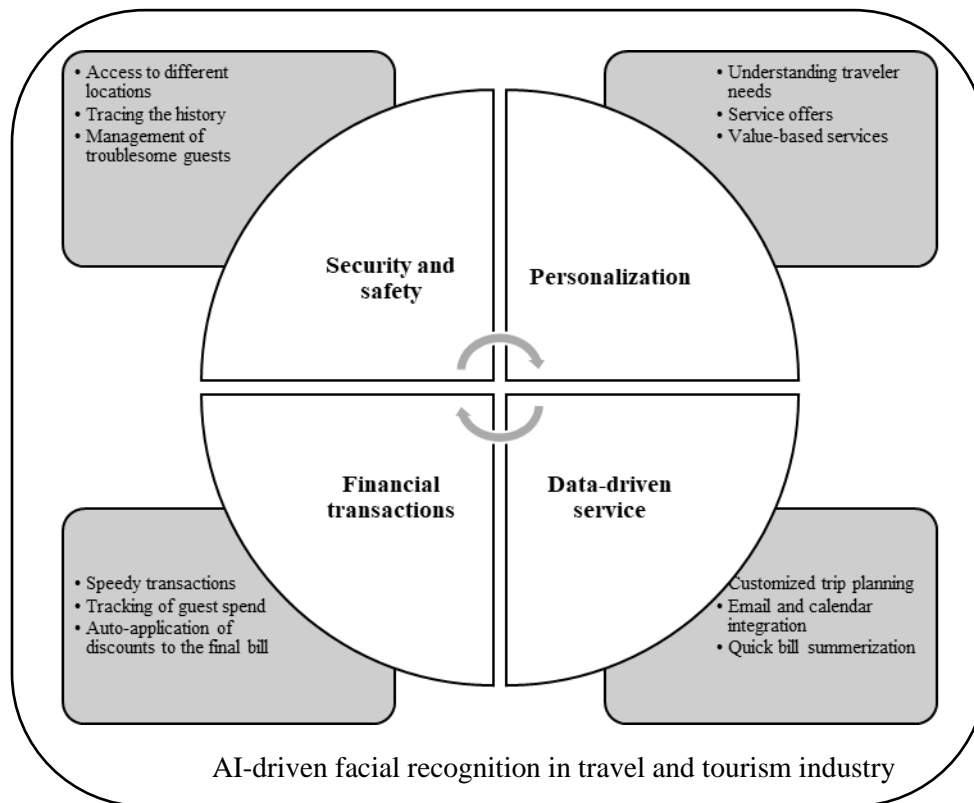
Facial recognition-based AI technology can help design consumers' portfolios on the basis of their spending (O'Grady et al., 2009). When asked about how they perceive facial recognition technology aiding them as a traveler, one respondent emphasised that *"the technology can help both traveler and tourism organizations by tracking spending in airport lounge[s], on food and beverage[s], in art exhibition[s], on fashion or entertainment to offer better services"* (Respondent 26: a 45-year-old senior manager with more than 10 years of experience in the IT services/software industry).

#### 4.2.4.3 Automatic application of discounts to billing

Hotel and restaurant guests are delighted when they receive discounts without any condition (Ciftci et al., 2021; González-Rodríguez et al., 2020). AI-based facial recognition technology can determine guests' satisfaction level and intention of visiting again. Hence, on the basis of the potential of a traveler, an AI-based facial recognition system can execute an automatic discount in the bill to further entice the guest to return. When asked how might the AI-based recognition system delight them, a respondent said *"an algorithm-based auto-discount calculated on the basis of the ticket price applied will encourage me to spread positive word-of-mouth and increase my revisit intention"* (Respondent 15: a 43-year-old senior manager with more than 10 years of experience in the human resources domain). These themes and sub-themes have been developed and formulated through a three-step systematic approach. For instance, the first theme on personalization is conceptualized as Step 1: identify similar keywords from respondents' statements: (i) "AI-based recognition can provide tailor-made and personalized choices"; (ii) "AI can absolutely transform different elements for privacy and personalization to accommodate the needs through multiplayer data system"; and (iii) "An ID proof and a photo can be asked while booking a hotel online, and the same can be used during check-in" (Kar & Kushwaha, 2021; Shyamasundar et al., 2021). Moreover, this technology can be integrated with connected services (IoT), where different services are billed to guests instantly or at a later time rather than spending time on paying for them at check-out. This process would be much more efficient during peak times, like festive seasons. Step 2: Form a meaningful statement: (i) understanding and optimizing traveler needs; (ii) specific offers; and (iii) value-based services. Step 3: combine all statements to form a final characteristic, that is, personalization.

### 4.3 Framework

The themes developed in this study fall under four main categories: personalization, data-driven service, enhanced safety and security, and seamless financial transactions. Figure 4 presents the framework that categorizes each of these to execute and provide memorable experiences in the travel and tourism industry, where AI-driven facial recognition technology facilitates the different aspects of service excellence.



**Figure 4.** AI-driven facial recognition in the travel and tourism industry

## 5. Discussion

This study investigated the role of AI-driven facial recognition in the travel and tourism industry. On the basis of OIPT, this study examined the different dimensions of personalization, data-driven services, security and safety, and seamless payments. Further, the study mapped the findings at different phases of the business traveler journey, from the idea of a visit to post-stay. This study responds to a dearth in the literature describing the benefits of AI-based facial recognition for travelers, organizations, service delivery, and industries. The study utilizes the

triangulation technique for validating the results to build a framework with the help of industry reports, experts in similar technologies, and academicians from tourism management and information systems. In sum, the findings suggest that multidimensional information processing through AI-based facial recognition technology can offer social, environmental, and economic benefits to the travel and tourism industry especially in today's dynamic context. The findings of this study provide a theory-based understanding of different dimensions to expand the domain of tourism and information systems. To this end, the study enables tourism practitioners to devise strategies for using AI-supported facial recognition for operations in travel and tourism.

On the basis of thematic analysis and semi-structured interviews, this study highlights unique and useful contributions for the travel and tourism industry, thus igniting the theory-based debates around the question: *How can AI-driven facial recognition impact service delivery, travelers, and the travel and tourism industry as whole?* (Zatori et al., 2018). This study can be viewed as an effort to incorporate and integrate the three fields of study: tourism management, information systems, and service operations management. Past studies have attempted to bridge the gap in tourism management and information systems, but these studies lack insights from in-depth interviews based on a grounded theory approach (del Rio et al., 2016; González-Rodríguez et al., 2020; Hadinejad et al., 2019). Moreover, this study highlights unique contributions on the basis of OIPT theory for academia and practitioners.

### 5.1 *Theoretical implications*

The study makes two theoretical contributions. First, it provides empirical support for presenting the views of business travelers and how they want travel and tourism firms to use AI-supported facial recognition technology to enhance service experiences. The adoption and implementation of AI-based facial recognition can help process the large and multidimensional information related to travelers, even in a time of complexity and uncertainty, to offer customized and personalized service experiences (Chang & Jung, 2017; Duan et al., 2019). The adoption of a related technological set-up can further facilitate stakeholders, such as insurance agents, travel agencies, and cab drivers, to process information quickly (Tenhiälä et al., 2018). AI-driven facial recognition technology bridges the gap between travelers' requirements and a firm's ability to provide a memorable experience during business visits. Further, data-driven service excellence (Kar & Kushwaha, 2021) from booking to post-stay can enhance the travelling and tourism experience of a visitor. In an complex and uncertain environment, the security of travelers can also be



enhanced with the matching of visual information such as images and videos. The information generated through facial recognition can be effectively utilized for enabling seamless transactions without using any cash or intervention in the service experience. These findings expand the boundaries of OIPT theory in different directions, ranging from personalization, data-driven service offering, and enhancing security to seamless financial transactions (Jun & Vogt, 2013; Wang et al., 2018).

Second, this study maps the influence of AI-based facial recognition in service design and delivery to travelers and the travel and tourism industry as a whole. Therefore, this study addresses the key research gap: *In what ways can AI-driven facial recognition help the travel and tourism industry?*

This question had remained unanswered in the field of tourism management and information systems (Buhalis et al., 2019; Lehrer et al., 2018; Samala et al., 2020). Previous studies in the field of information systems and tourism management demonstrated that facial recognition has become important in the travel and tourism industry (del Rio et al., 2016; González-Rodríguez et al., 2020). However, these studies had not examined the dimension of applying technology effectively to help organizations, travelers, and the service delivery. Firms in travel and tourism can gain a competitive advantage if they tailor, execute, and maintain technologies to services appropriately. This study addresses the specific role of AI-supported facial technology in different areas of the travel and tourism industry, where it acts as a support enhancing the information processing capabilities of an organization in multiple directions compared with traditional one-way applications, such as facial recognition in airports only (del Rio et al., 2016). Instead, we recommend the application of AI-based facial recognition in booking, travelling, stay, and post-stay services to offer travelers a better experience. The study has made contributions to the travel and tourism literature by understanding the need of corporate professionals, who have limited time during their visit and seek professional services. Further, this study has tried to extend the travel and tourism management literature by addressing the gaps of information utilization for message-based platforms, self-check-in kiosks, or front desk technologies (Change & Yang, 2008; Shin et al., 2019; Zhang et al., 2018) compared with harnessing the power of AI-based facial recognition to enhance the personalization, data-driven service excellence, security, and seamless transactions (Dwivedi et al., 2019).

## 5.2 Practical implications

AI-driven facial recognition is expected to improve accuracy, speed, and transparency in the travel and tourism industry. The respondents in this study highlighted the role of AI-driven facial recognition in facilitating the loyalty program for frequent flyers from corporate. Business travelers' needs are different from those of leisure travelers in terms of time, cost, quality, and speed. Travel and tourism firms need to find a balance between data privacy and the traveler experience, especially for business executives. Another expectation of travelers is to incorporate the emotional quotient in AI-driven facial recognition system to replace human interaction. Business travel is traditionally paid through the traveler's office, hence, offices need to permit their executives to authorize the services availed and approve real-time payment. Therefore, the travel and tourism industry needs to take certain steps to mitigate risk and build business travelers' confidence in using AI-driven facial recognition technology.

The findings of this study offer guidelines for tourism industry managers who are considering installing AI-based facial recognition systems. Before making an investment decision regarding the AI driven-facial recognition technology space for their business, practitioners should evaluate: (i) the degree of *customization* they want to offer; (ii) the degree of *data-driven decision making* in service operations as guests consume their services; (iii) the points of *security* they want to cover; and (iv) the degree of *automation in payments*. Hence, this *four-point* formula may help management decide on the adoption of AI-driven facial recognition technologies to drive the total benefits in the travel and tourism industry. Adoption of AI-driven facial recognition technologies also facilitates tourism managers' meeting environmental criteria by reducing waste and the use of non-renewable resources (Xue et al., 2020) when booking through travel agencies, airlines, insurance agents, and hotel. Moreover, the AI-driven facial recognition system can be helpful in verifying any customer's insurance claim. Organizational information processing capabilities can be improved with the AI-driven facial recognition system, which can further enhance organizational performance (Rana et al., 2021). The technology also offers the integration with and collaboration of different departments to offer exceptional service delivery. Therefore, travel and tourism managers should ensure the different dimensions contributing toward organizational development, ranging from processing capabilities to gaining competitive advantage.

### 5.3 *Limitations and scope for future research*

This study investigated the role of AI-based facial recognition in the travel and tourism industry. This study has a few limitations. First, OIPT has received attention, but it has also led to equivocality, in addition to uncertainty, as noted by Haußmann et al. (2012). We have not considered organizational structure and interpersonal characteristics, along with interdepartmental characteristics, which are critical to designing an information system for an organization. Future studies could consider the dark side of AI, or ethically responsible AI, to optimize the business value of organizations in travel and tourism (Enholm et al., 2021; Rana et al., 2021). Owing to the COVID-19 pandemic, we contacted respondents virtually and the data was collected online through Google forms. While we discussed the agenda and selected the respondents carefully, the latter understood the questions according to their own background and experience in the travel and tourism industry. Moreover, some questions were answered in a hurry, due to their pre-occupation with their jobs. We targeted respondents who were business travelers; hence, the findings may not reflect the views of leisure travelers. Thus, future studies could compare the expectations of business and leisure travelers. Apart from OIPT, the adoption of AI-driven facial recognition could be examined from a dynamic capability view (DCV) or a resource-based view (RBV) to enhance service excellence in the travel and tourism industry. Apart from the grounded theory approach, case studies, ethnography, or action based research could be conducted to further validate and advance the findings of this study. Further, empirical study could also be conducted to understand the AI-driven facial recognition from a wider perspective.

## **6. Conclusion**

This study investigated the ways in which AI-driven facial recognition helps the travel and tourism industry. Using OIPT, this study investigated the potential applications of AI-driven facial recognition to enhance the value and experience of corporate travelers. Refereeing OIPT, the study investigated different dimensions of corporate guests' service experience such as personalization, data-driven services, security and safety, and seamless payments. Further, this study maps the findings in different phases of the business traveler journey, from discussion of a visit to post-stay. This study responds to the insufficient debate in the literature failing to describe benefits of AI-driven facial recognition technology for travelers, organizations, service delivery, and industry as a whole. This study utilizes the triangulation technique for validating the results to build a framework with the help of industry reports, experts in similar technologies, and academicians from both tourism management and information systems. In sum,

the findings of this study suggest that multidimensional information processing through AI-based facial recognition technology can offer social, environmental, and economic benefits to the travel and tourism industry even in today's dynamic settings. The findings of this study offer a theory-based understanding of different dimensions to expand the fields of tourism and information systems. To this end, the present study provides tourism practitioners with options for formulating strategies to utilize AI-supported facial recognition for travel and tourism operations.

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