



**ADVANTAGES AND CHALLENGES OF USING BIOMETRIC
TECHNOLOGIES IN TOURISM**

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Annotation: Biometric technology has the potential to significantly contribute to the growth and recovery of the tourism industry by delivering faster, safer, and more convenient services. However, for their successful implementation, all tourism sector stakeholders must pay close attention to issues of privacy, data protection, cybersecurity, and ethical considerations. As a result, the future of biometric technology in tourism is dependent not only on technological advancement, but also on the ability of governments and tourism organizations to assure the safe and responsible use of tourists' biometric data.

Key words: Biometrics, Airports, Train station, Data, Information, Technologies, Scan,

Introduction: The tourist business has undergone a substantial transformation in recent years due to the rapid growth of digital technologies. Travel planning, transportation, lodging, and access to various tourism amenities have all been altered by technological advancements. Biometric technologies have grown in significance among these breakthroughs because they can offer quicker, safer, and more convenient services. Biometric technologies identify and validate people using distinctive physical or behavioral traits, such as fingerprints, voice recognition, facial recognition, and iris scans. These technologies are being utilized more frequently in the tourism sector at border control points, hotels, airports, and other tourism-related establishments. For instance, biometric identification can make hotel check-in easier and increase security, while facial recognition technology can speed up



airport operations. Both travelers and tourism service providers can benefit greatly from the usage of biometric technologies. Wait times can be shortened, security can be strengthened, customer satisfaction can be improved, and operational efficiency can be raised with these technologies. Additionally, tourism businesses may be able to provide their clients more convenient and individualized services with the aid of automated identification systems. The purpose of this essay is to examine the primary benefits of biometric technologies in the travel industry and to pinpoint the key obstacles that could occur when they are put into practice. The report also emphasizes how crucial it is to strike a balance between efficiency, security, technological innovation, and the privacy of visitors' personal data.

Main part: Currently in 21st century is becoming common technological period. In different companies in tourism such as, airports, train stations, museums, and even the companies which are not up to tourism industry is settling modern technologies to reduce human factors and control all companies' data easily. For this reason, some technics in technological world are using every day. Fingerprint, face, and iris patterns are just a few examples of the distinctive patterns that biometric authentication systems employ to automatically identify people. The majority of airports, office buildings, banks, government buildings, smart devices, and electronic wallets all use biometric approaches for access management, thus they are not new. The conventional password is rapidly being replaced with biometrics for authentication. This is typical in the iPhone X, which uses FaceID, and the majority of handsets, which have the most popular forms of biometrics and fingerprint recognition. We can authorize our banking transactions and online purchase payments with simply a face scan or fingerprint on our smartphone thanks to the excellent security, accessibility, and usability of biometric features. Murphy and Rottet carried out a study to examine the acceptance of biometric technologies in hotel operations. Biometric systems can be used as an alternative to traditional procedures in



several areas, including identity verification, accessing information, making reservations, entering hotel rooms, and completing payments. The results of their study indicated that most participants were willing to use biometric applications in hotel services, with fingerprint recognition being identified as the most popular and preferred biometric method. In China, Marriott International and InterContinental Hotels have introduced self-service check-in kiosks equipped with facial recognition technology and artificial intelligence-based services. Facial recognition can make the check-in procedure faster and more efficient, allow guests to access their rooms automatically, and contribute to an improved overall hotel experience. Singapore's Changi Airport has introduced a biometric-based border control system that includes biometric immigration kiosks, contactless check-in procedures, and various hygiene and cleaning innovations. These measures can help reduce travelers' concerns about the spread of diseases while providing a safer, more comfortable, and faster border-crossing experience during and after the COVID-19 pandemic.

This development demonstrates that biometric technologies have become increasingly important in the tourism industry, particularly in the new environment that has emerged following the COVID-19 pandemic. In our modern world what kind of biometric technologies exist and in which purpose touristic companies are using them. In generally what is the biometrics?

Biometrics refers to the physical and behavioral characteristics of individuals that can be used to identify and verify their identity. Since every person has unique characteristics, biometric systems can use these features for identification purposes. Physical biometric characteristics include fingerprints, palm prints, iris patterns, facial features, ears, and signatures, which can be directly measured or recorded from the human body. Behavioral biometrics, on

the other hand, includes characteristics such as voice, walking patterns, signing behavior, and keystroke patterns.

Iris- recognition is considered one of the most reliable methods of biometric identification. According to Bowyer, this technology is often described as a “single-enrolment for life” system because iris patterns remain largely stable throughout a person's lifetime. The iris develops around the eighth month of pregnancy and maintains its main characteristics throughout human life. Even identical twins do not have the same iris patterns. In addition, the iris patterns in a person's left and right eyes are different from each other. Because of these unique characteristics, iris recognition is regarded as one of the most accurate methods of biometric authentication. One of the major advantages of this technology is that the identification process can be completed without physical contact. In other words, users do not need to touch a scanner or another device during the iris scanning process. This feature can be particularly useful in airports and other crowded tourism environments. However, the technology also has certain limitations, as difficulties may occur when identifying individuals with cataracts or serious visual impairments. The system was able to identify passengers within a very short period of time, approximately two seconds. The collected biometric information was compared with security databases, including blacklisted records. As a result, the system helped identify thousands of individuals who were attempting to travel using false or fraudulent identities.

Face recognition- Like iris recognition, facial recognition technology can operate without requiring physical contact with a scanning device. When a tourist arrives at a border checkpoint, an image of their face is captured and then compared with facial images stored in a database and the photograph contained in the passport chip. This procedure helps verify the traveler's identity and reduces the need for manual inspection by immigration officers.



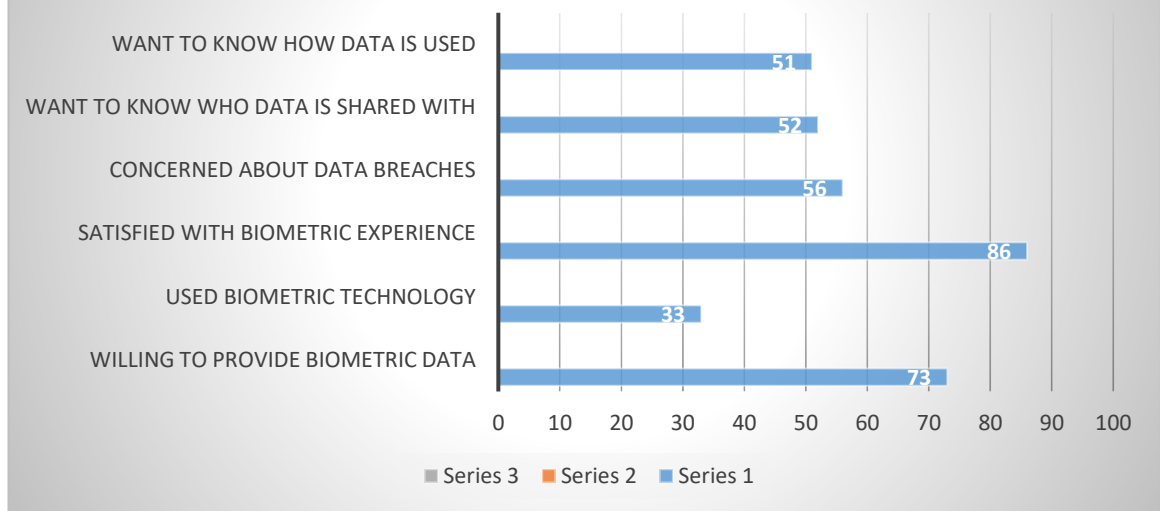
Facial recognition has become an important component of automated border control systems, partly because International Civil Aviation Organization (ICAO) standards support the inclusion of facial images in biometric passports. Countries such as Australia, South Korea, and Taiwan have adopted facial recognition systems at airport immigration checkpoints on a relatively wide scale. While the United Kingdom moved from iris recognition toward fingerprint-based identification, South Korea followed a different direction by gradually shifting from fingerprint technology to facial recognition. Although fingerprint verification was still being used at South Korean automated immigration gates, facial recognition technology was introduced to modernize and simplify immigration procedures.

According to the IATA Global Passenger Survey, the adoption of biometric technology in air travel has increased significantly. In 2025, 50% of passengers reported using biometric identification during their airport journey, compared with 46% in 2024. Furthermore, approximately 86% of users expressed satisfaction with biometric services, while 74% of travelers stated that they would be willing to share biometric information in exchange for a more convenient and contactless travel experience.

According to an IATA survey involving 13,579 respondents from 186 countries, the findings showed that 73% of passengers were willing to provide their biometric data to speed up airport procedures. In addition, 36% of respondents had already used biometric technology during their travel experience, and 86% of these users were satisfied with the experience. At the same time, privacy and security issues remained important concerns regarding the use of biometric technologies. Specifically, 56% of respondents were concerned about potential data breaches or theft, 52% wanted to know who their personal information would be shared with, and 51% wanted to understand how their biometric data would be used.



Statistics regarding using biometric technologies



Advantages and challenges of biometric technologies

Privacy is one of the major concerns associated with the use of biometric technologies in tourism, particularly when their use is mandatory. Tourists may experience discomfort or feel stigmatized when they are required to provide biometric information, as fingerprinting and other identification procedures have historically been associated with criminals and law enforcement. Consequently, some individuals may feel that they are being treated as potential criminals or terrorists rather than ordinary travelers.

Physical privacy concerns also arise from fears about the safety of biometric technologies. Although systems such as fingerprint and iris recognition are generally designed to be safe, some users worry that these technologies could cause physical harm, health problems, or long-term exposure to radiation. Concerns about the misuse or theft of biometric data may further reduce public trust. Research has demonstrated that biometric systems can potentially be deceived through techniques such as artificial fingerprints, reinforcing users' concerns about the security of their personal biometric information.

Cultural and religious beliefs can also influence the acceptance of biometric technologies. Some individuals consider the collection of biometric data to be inconsistent with their religious or personal beliefs and may therefore feel uncomfortable using such systems. In certain cases, biometric identification has been perceived as a violation of personal dignity, freedom, and control over one's own body. The feeling of having little control over personal biometric information can discourage individuals from using biometric applications. These concerns may be particularly significant for minority groups whose cultural, religious, or personal values conflict with biometric identification procedures.

Overall, although biometric technologies can improve security, efficiency, and convenience in tourism, concerns related to privacy, stigmatization, physical safety, cultural values, and religious beliefs may negatively affect tourists' willingness to accept and use these technologies. Therefore, tourism stakeholders should consider these ethical and social concerns when implementing biometric systems and ensure that their use respects individual privacy, dignity, and personal beliefs. Hygiene is important concern associated with the use of biometric technologies in tourism, particularly for individuals who are highly sensitive to germs and contamination. Contact-based biometric systems, such as fingerprint and hand scanners, require multiple users to touch the same sensor surface, which may create concerns about the transmission of bacteria and other microorganisms. The perceived cleanliness of biometric devices can therefore influence tourists' willingness to use these technologies. Some travelers may feel uncomfortable or avoid biometric systems if the equipment appears dirty or has been used by many people, especially during periods when infectious diseases such as influenza or colds are widespread. These concerns may be particularly significant for individuals with a strong fear of contamination or germs. Similar discomfort can also occur when users are required to position their faces close to biometric scanning devices.



Therefore, maintaining proper hygiene and cleanliness is essential for improving tourists' trust, comfort, and acceptance of biometric recognition technologies.

Conclusion: Biometric technologies are increasingly used across different areas of the tourism industry, including airports, hotels, events, and other hospitality services. However, their widespread adoption has raised important concerns regarding privacy and data security. Tourists may worry about how their biometric information is collected, stored, shared, and protected from unauthorized access, hacking, or data leakage. Since biometric data can potentially be used to identify and track individuals, ensuring strong data protection is essential for maintaining public trust. The COVID-19 pandemic also increased awareness of hygiene concerns related to contact-based biometric systems. Technologies such as fingerprint scanners require physical contact with surfaces used by multiple people, creating concerns about the possible transmission of microorganisms. As a result, contactless biometric technologies, including facial and iris recognition, have become more attractive alternatives because they can improve both convenience and health safety. Several airports have already introduced contactless biometric solutions to reduce physical interaction and support safer travel. In the post-pandemic tourism environment, biometric technologies have the potential to support the recovery of the tourism sector by improving security, efficiency, and travelers' confidence. The integration of contactless biometrics with digital health and travel verification systems could facilitate smoother and safer travel experiences across airports, accommodation facilities, transportation, and other tourism services.

Furthermore, combining biometric systems with technologies such as artificial intelligence and blockchain may improve security, data management, and the overall tourist experience. Nevertheless, the successful implementation



of these technologies requires tourism stakeholders to balance innovation and convenience with privacy, data protection, hygiene, and ethical considerations. Addressing these challenges will be essential for creating a safer, more efficient, and sustainable tourism ecosystem in the future.

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