

Chapter 8

Revolutionizing Air Travel in India: The Impact of DigiYatra

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ABSTRACT

Digital technology has transformed various sectors with aviation not being exceptional. DigiYatra a government-promoted app enhances the traveller's experience by streamlining the operation. A blockchain-based identity management system DigiYatra uses a digital identity system which stores travelers' information on a distributed ledger. The airports and the airlines adopt the system to enhance the security of travellers, reduce the waiting queues in airports, and provide seamless travel and great experience. The chapter explores the revolutionary role of DigiYatra in air travel in India. The study uses online reviews of travellers about their experience using the app. The findings of the study state that security, experience, efficiency, and digitization are key factors for adopting digiyatra. The study's results will assist the government in understanding adopting digital technologies which can redefine

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the Indian aviation industry and make it future-ready

INTRODUCTION

The aviation sector in the last decade has witnessed a rapid transformation which is influenced by external factors and innovative digital technologies (Pereira et al., 2021). Air travel has become a main mode of travel in Asian countries including India (Chaouk et al., 2019). Domestic travel in India has received tremendous growth in the last few years. India currently is one of the largest (domestic) civil aviation markets of the world with more than seventy per cent of travellers being domestic. The increase in aviation demand is mainly because of the rising working population especially the rising middle class and the business and leisure travel. It is advised that travellers arrive at the airport at least two hours before a domestic flight and at least three hours before an international flight for security check as it takes about 1.5 to 3 hrs for visa process checking of documents and passports which sometimes have long queues (Sorenson, 2018).

With the increase and the massive volume of air travellers streamlining them along with securing the airport is of prime importance. Considering streamlining of security in airports across the world requires the adoption of innovative technology for enhancing the travellers' journeys. It is believed that there will be a paradigm shift from paper to paperless with the usage of biometrics at airports. The efficiency in the airports is reimagined by offering an incredibly seamless and hassle-free experience (Sorenson, 2018). Passengers at the airport go through a cumbersome process of planning and scheduling, check-in steps, baggage management and security clearance which many times do reduce the overall satisfaction of air travellers. The emerging technologies use blockchain to enhance the digital identity and data privacy (Back, 2017) of travelers at the airport with the usage of facial recognition systems.

The facial recognition system is a technology-driven application which can identify and verify individual images and match them with digital images which is already inscribed. The recognition systems are computer-based security systems which detect and identify the human face. The main function of a facial recognition system is the neural mechanism system for face perception like the distance between the eyes, the shape of cheekbones along with other distinguishable features. The measures are tallied with the entire database of pictures to obtain the perfect match (Guleria et al., 2024). The face identification research and match it against a database to identify the face of an individual. As it is difficult to remember the name and face of an individual who may have been on the wanted list, facial recognition will automatically identify a person entering the airport as it will track the image of an individual and compare it with a database of photographs. The facial

recognition tracks by capturing images of individuals and then using an algorithm to compare them with the database of photographs and alerts the security if there is a match. Any filter does not influence the system like age, gender, race, or country of origin (Khan & Efthymiou, 2021). The facial recognition in airports could also restrict employees to only those areas where they are authorized to enter and can alert security if any unauthorized entry happens. Facial recognition technology is used autonomously to process passengers at checkpoints from entry at the airport to aeroplane boarding.

Knowing about the traveller's composition and passenger evaluation of airline services helps in planning aviation infrastructure to meet the future demands of aviation in Indian cities. The traveller identification procedure in India has consistently been manual verification with paperwork, creating bottlenecks. The usage of hard copies of paper-based identification like identity proofs, flight tickets and boarding passes at each touch point does influence both the security personnel and also the traveller's experience. The multiple-identity verification with travel documents at the airport causes inconvenience to the passenger and is not suitable considering the passenger growth in larger airports in India. In developing countries like India although there is a concern about applying digital technologies the application of it in real-time is not as in some developed nations. For this, facilities like self-check-in are necessary for travellers to make their lives more convenient (La & Heiets, 2021). With the growing number of travellers at the airport and the security concern, the government of India conceptualized a national biometric digital identification system for air travel in 2016. Digitalization is the adaptation of using different digital technologies to change various aspects of people's surroundings (Gray & Rumpe, 2015). Researchers (Lenka et al., 2017) believe that digitalization helps industry and firms to change their strategy and performance. The core of digitalization is not restricted to data as it needs to be modelled by analyzing and summarizing the characteristics along with the obtained modes of digitization which is required for resolving requirements in various fields. After policy debate and technological planning, the Digi Yatra program was approved for country-wide implementation. The DigiYatra enables paperless travel and rejects repeated identity checks. The main motto was to provide a seamless travel experience by eliminating multiple time presenting of identity cards and other travel documents. The Digi Yatra provides a seamless air travel experience by removing the need for presenting identity information and travel documents for security checks. The travellers instead have to enroll once in Digi Yatra and they can upload their biometric authentication at the airport security check areas. The study considers examining Digi Yatra to check regarding improving the travellers experience and also security as the entire digitized process is encrypted for end-to-end air journeys. The research aims to find if Digi Yatra could enhance the travellers' experience along with the necessary security required for air

travel. The study will also state the travelers challenges and perceptions which are linked to the digital ID system. The findings will help Digi Yatra to be more robust and contribute to a broader global discourse by creating appropriate infrastructure for air travel in India.

REVIEW OF LITERATURE

Digi Yatra is a central biometrics–linked database which recognizes boarding passes and flight details. The traveller at a respective location has to pass through a facial recognition scan which is tallied with the database for verification at all entry points, security checkpoints, and also at boarding gates. The program was launched in August 2022 in the country and is currently operational in 13 airports and 14 more airports are to be added soon. The advent of Digi Yatra is a major change towards modernization and digital air travel in the country. Although it is a technological transformation still there are concerns regarding privacy, exclusion and optimum implementation of the project. DigiYatra uses facial recognition technology, which makes terminal entry and security seamless, without any hassles and a paperless process. The DigiYatra application is a decentralized mobile-based identification storage platform which can store identification documents and travel documents. The platform introduced by a combination of the Ministry of Civil Aviation (MOCA) and DigiYatra Foundation is for creating a digital society. DigiYatra is the future for air travel which enables the automatic digital processing of flyers reducing the travelers' waiting time and making the boarding process faster and seamless as in Figure 1. The concept of DigiYatra is on four pillars connecting travellers, connected flying, connected airports, and connected systems which ensures easy entry at all checkpoints. The data in DigiYatra is saved in an encrypted format with blockchain technology being used. All the data is stored in the passenger's phones and the data shared with the airport is removed 24 hours after the traveler completes the journey. DigiYatra ensures enhanced security at the airport as the passenger data is validated along with the airline's departure control system which allows only designated passengers to enter the terminal.

Figure 1. Flow chart



The DigiYatra foundation is engaged in DigiYatra central ecosystem which aims to provide a seamless and memorable digital experience and considers a real-time selfie-based facial biometric validation for its authentication purpose. The main mission of the DigiYatra assures a seamless journey with a firm sense of ease for passengers from embarkation to arrival. DigiYatra prioritizes sustainability with a transition to a complete paperless automated authentication and verification process slashing the carbon emissions and moving towards a more ecologically responsible future. To preserve data security and privacy DigiYatra adopts a technology of decentralized identity, self-sovereign identity and verified credentials enabling authentication and verification which does not store or accumulate data on the server. The blockchain technology used by DigiYatra works in the background enabling it to maintain privacy. The blockchain runs on computers which are in multiple locations so the data is not stored in a single database to avoid the risk associated with one central database. The transparency of blockchain provides increased confidence as transactions are observable and irretrievable and also the clearance of recorded transactions (Tapscott & Tapscott, 2017). With utilizing DigiYatra application the user undergoes authentication followed by retrieving data from either DigiLocker or Aadhaar. After the retrieval of data, the same is matched with the Aadhaar. On confirmation, the authenticated selfie along with user information including name, gender, date of birth, and masked Aadhaar form a verified credential stored in Digi Yatra Wallet. The data obtained from the Aadhar is deleted as nothing is stored on any server. The entities which are integrated into the DigiYatra platform like airports readily acknowledge and validate verified credentials which allow entry to the airport. The exchange of information along with validation is initiated by the user for accessing the services and the important data is shared by the traveller when a boarding pass is necessary mostly 24-48 hrs before the journey. After the departure of the flight the airport automatically deletes the travelers' data. Audits regularly ensure compliance along with checks at airports that verify timely data. For security reasons a mandatory policy is made by which no minors can create a verifiable credential without the consent of the guardian. At first, the guardian or the parent has to create their verified credential before the same is created for the minors. The DigiYatra an ambitious biometric facial recognition program aims to transform the end-to-end air transit experience with touchless, paperless processing by digital identity authentication. Biometrics is used for authentication and identification as it is challenging to match the data with what was taken previously. The authentication is used for verifying and a final decision is made on the degree of similarity. The biometric system tallies the scanned data with those already captured for comparison. The biometric technologies consist of both hardware and software, the identification device is the hardware that helps to collect, read and compare the biometric data. The biometric data are obtained from an individual unique to that

person. The software fixed in the biometric technology processes the biometric data. The software and the hardware ensure that the data is captured and extracted match. The user adoption pattern is used to understand the acceptance of the facial recognition digital ID and the apprehensions that impact voluntary enrollment. The pace of adoption depends on how the travellers switch over to biometrics-based air travel.

The usage of biometric identification is widely accepted in the development of modern airports. A lot of research has happened to examine the application, opportunities and challenges which are associated with incorporating biometric systems at the airports. Initial studies (Souto et al., 2013) analyzed facial recognition systems and later used for travellers at the Miami and Washington Dallas airports to have a fair improvement in processing times at airports. A study on the initial implementation of biometrics in UK airports discussed the privacy concerns of travellers. Trials with facial biometrics to expedite the security check at the airport in Australia are also considered (Bromberg et al., 2020). The biometric facial recognition software does identify people by crosschecking different facial features and allowing the face to be used for access at the airport. Along with other countries opting for biometric and facial recognition systems India pioneered an Aadhar-based biometric ID system which integrates travellers' data with the Aadhar data for aviation security. There has been a risk to data privacy and surveillance of Aadhar as some of the data was leaked and automatic facial recognition increases the risk of data stealing. The pace by which the transformation to digitalization depends critically on how the travellers embrace the biometrics air travel model. The research study provides a framework to find whether a digital innovation like DigiYatra achieves its goal when implemented on a large scale across all airports.

This study is conducted to understand the implementation of DigiYatra and how it will provide a seamless, futuristic air transit for the citizens of India. The study focuses mainly on passenger experience, security, and adoption aspects of Digi Yatra and how it will enhance future travellers' convenience by reducing the time spent. The study adopted a qualitative approach with semi-structured interviews to assess the traveller's perception of a hassle-free air travel facility with biometrics and facial recognition. It will also probe the impact of DigiYatra on airport security as data privacy and surveillance risks are common for any centralized biometric database. It also considers how digitized passenger verification will be for convenience reducing the time spent on travel. The study findings will help to obtain the key learnings about DigiYatra and how India can make biometric travel more efficient, trusted, and inclusive for travellers. It will also display globally how facial recognition could be used for digital identity by the aviation sector. As India moves on with its digital transformation of air transit it can lead to other countries considering similar initiatives. The research aims to provide evidence-based insights which support balancing innovation aspiration with ground realities for maximum benefit of the public. We

can summarize that the study will help to understand how the biometric digital ID system delivers a smoother, safer and more modern air transit for one of the world's fastest-growing aviation market and a road for the country's digital journey.

METHODOLOGY

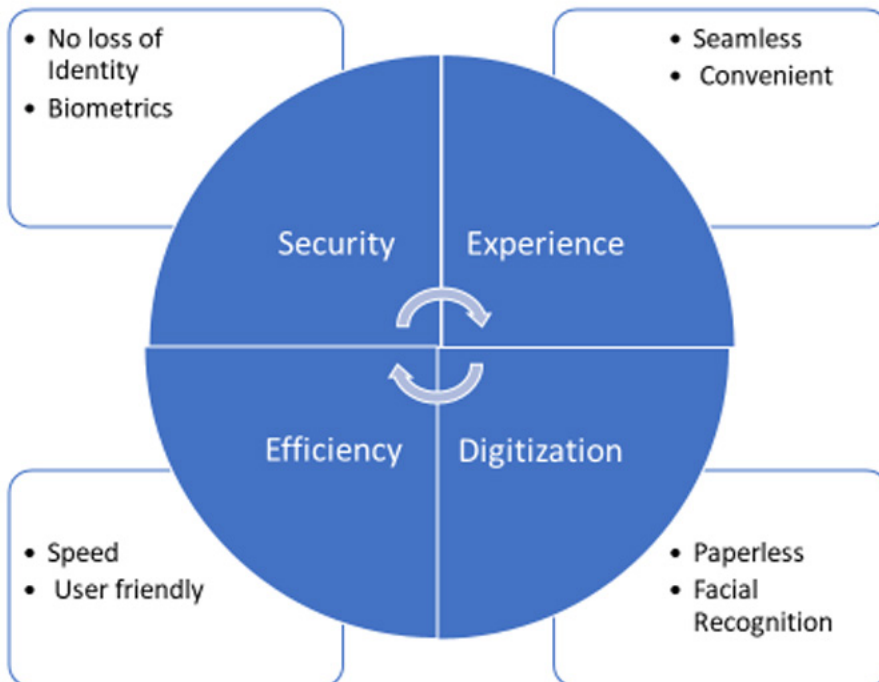
The study adopted a qualitative approach by using semi-structured interviews. The qualitative method allows us to obtain answers to questions which are difficult for the quantitative methods to conclude with (Savin-Baden & Major, 2013). The qualitative study helps to identify variables which can be later analyzed quantitatively, or quantitative measures may not describe them appropriately (Marshall & Rossman, 2014). The face-to-face interviews were conducted for the study with extreme care taken to follow up while collecting and analyzing the data. The study targeted frequent air travellers using the airports which had DigiYatra facilities. The travellers who had used DigiYatra were the only respondents in the study and had used it at least once in three months. The data was collected in two cities Delhi and Bengaluru as they were the major airports in North and South India where DigiYatra facility is available. The semi-structured questions asked in the interview were refined with consultation of academicians and industry practitioners. The questions were open-ended to obtain maximum input and the best insights (Marshall & Rossman, 2014). To minimise the bias during the interview and for data analysis precautionary steps were taken in which initially the questions were generic followed by specific questions. A purposive sampling was used in the study and appropriate care was taken during the interview so the interviewee would not be influenced. During the interview process few steps were followed the conversation was followed with the interviewee with proper referencing stating the objective, considering travelers' experience with the DigiYatra platform and also interviewing the respondent with a semi-structured question. The responses were collected from travellers during March, April, and May 2024 with each interview lasting 25 to 30 min.

The data obtained from the travellers were analyzed by thematic analysis where the data was narrowed for coding the interviews and then they were categorized further into themes and sub-themes as necessary. To ensure the reliability and consistency of data adequate interviews were conducted considering that similar responses will be obtained for saturation. The process was conducted till the responses obtained reached a saturation point. All the respondent's points were considered and the outcome was reported. Care and consistency were undertaken for collecting and recording data to confirm the intended meaning of the respondent which was reviewed.

RESULTS AND FINDINGS

The study findings state that travellers have adopted DigiYatra at airports which provide their services. The themes developed from the study fall under four main categories security, experience digitization, and efficiency. Figure 2 presents the framework that categorizes each of the themes of travellers using DigiYatra. The preference for adopting DigiYatra is for security as there is no reason for travellers to carry their boarding passes and identity proofs. The experience of the travellers opting for DigiYatra is quite satisfactory with some having a great experience. The digitization of the entire process is also a reason why travellers have adopted for it. DigiYatra has changed how travellers' time is spent at the airport entry and in the security check area as the efficiency of the process has a positive impact on travellers.

Figure 2. Chart



Security

Facial recognition and biometrics are used to authenticate the traveller's identity at an airport to meet the needs of the customs department and protect the country's borders.

“There is a risk of the use of sensitive biometric data for boarding which is essentially shared or will this over-surveillance extend in time to every single movement an individual does? As an individual who is the owner of the data, do I have any confidence that there are adequate controls in place for the entire lifecycle of the data, including deletion?”

The biometric data is held on the device in a secure wallet. The transmission is encrypted from end to end and the server purges data 24 hours after flight departure. The document says they at least confirm to NIST CSF, ISO 27001 and the Data Privacy Act.

The security feature of Digi Yatra does not open the gates if the flight departure time is beyond a certain period of about 6 hrs. DigiYatra will be more secure while non-DigiYatra will ask for more scrutiny.”

Most travellers believe that biometric authentication has enhanced airport security and reduced the risk associated with forged identities and documents. The DigiYatra also strengthened the security protocol with other identity databases which are necessary for law enforcement.

Experience

The travel experience is arbitrated also by speed, the coherence of a service and also on its reliability (Mahmoudi & Duman, 2015).

“Used DigiYatra 20 + times during the last few quarters, and surprisingly has been a seamless experience, saving time especially Delhi airport. Also with so much of personally identifiable data openly available and shared, it makes little difference in opting out of a single/ app service like DigiYatra.

Yes it has made our lives simpler. The airports are anyways high- security zones with scores of cameras recording our moves. We assume that this data will be with the government but do we know or care with which entity? All-in-all, it is a fair deal to use the app if it saves time as our data is anyway public.

I had to take an early flight out of Hyderabad. I reached the airport at 4.45 Am after completing check -in online with just a cabin bag in hand. By 4.52 Am I was at the gate having been able to skip the lines thanks to DigiYatra. Considering that the seven-minute timeframe included the time it took for me to walk from the car to the departure ramp to the airport entrance. Overall experience is great.”

The findings do state that DigiYatra has improved the convenience of the travellers by reducing time spent in the airport queues. The verification process of the travellers has also been quick, leading to faster movement of the travellers to the boarding gates.

Digitization

The digital transformation in airports applies to the self-service check kiosks at airport entry points and on self-check boarding gates. Air travel digitisation has been the focus with biometric boarding, digital bag drop, and electronic passports with automated passenger processing and luggage handling being implemented at various airports in the country.

“Big fan of DigiYatra as I use it frequently at Mumbai, Delhi, and Bengaluru airports. I had put my bag & laptop through screening and just walked through the security check-in 30 seconds. With DigiYatra you don’t need to carry your boarding pass & driving license you can just flash your face & smile. Recently though DigiYatra in Delhi, I reached the boarding gate from the airport entrance in just 15 minutes.

The credentials are validated after the photograph of the self is validated against the Aadhar as this and the uploaded boarding pass help a smooth entry to the airport.”

Digitization in India is by Aadhaar biometrical identification which is a digital database comprising data of almost all Indian citizens and creates a seamless, paperless travel experience. Aadhaar from the beginning was a surveillance project disguised as a development intervention (Abraham, 2019). It is stated to be the first step for the digitalisation of India.

Efficiency

“DigiYatra since its launch has been a breeze at the airports. I mostly travel for business trips which makes it easier with DigiYatra which has separate entry gates”

DigiYatra is a great time saver and gives you a VIP feel as you bypass the queue and enter the airport without waiting. No boarding passes, ID proofs, as you just stand and wait for the gate to be opened as soon as your scan is done. My last few travels were without hard copies of the boarding pass at the entrance. Truly Digital India.

DigiYatra is still faster. From a technical standpoint, the system has to authenticate your face with only those who are expected to enter the airport in the next few hours as it is faster than the overworked CISF staff”

The DigiYatra has reduced the average passenger processing time by 10-12 minutes. The queues in large airports especially in the morning were too long and travellers had to be in the airport quite ahead of schedule. With DigiYatra the traveller's time in entry and the security check has been considerably reduced.

DISCUSSION AND CONCLUSION

The study findings suggest that the DigiYatra program expedites air travel by reducing time and improving the convenience of airport officials by enhancing speed and efficiency. The data from the interview also states that enrollment in DigiYatra is less because of low awareness, registration complexities and the fear of data misuse. Some travellers are also apprehensive about surveillance of their facial data misuse although biometrics is essential for security. It is also observed that DigiYatra improved security by reducing the forgery of paper documents. The centralized database assists in real-time verification however the effectiveness is based on how the data is kept secure from leaks. Although digitization has shown early chances of achieving goals there are challenges to the adoption and travellers perception which are to be addressed. For the Digi Yatra to be operational to its full potential it necessitates upgraded infrastructure, creating awareness amongst the travellers and building trust. A combined interpretation of the sentiments of all stakeholders could help guide India towards a more responsible, sustainable, and digitized journey.

The study investigates the role of DigiYatra in air travel in India. The study has few limitations as the data was collected from only two big airports in India and the opinion of travellers and their experience in other airports could not be generalized. Though the respondents were briefed before about the purpose of the study the questions were answered by the travellers as per their own experience and understanding. Most of the travellers were in a hurry as they were leaving the airport and the response was brief and not detailed. The travellers in the study were mostly business travellers so the experience of the leisure travellers could not be ascertained. Future studies should be undertaken to understand the leisure travellers' perspectives on DigiYatra and compare and contrast the same with business travellers.

In the future, research may also look into other unexplored dimensions like air-ground transport integration and other airline perspective, comparing studies across nations, and evaluating cybersecurity concerns in depth which will assist in air travel digitization. The study findings will help us understand the travellers' different views about the various aspects of DigiYatra. To this, the present study provides the DigiYatra operators and managers with options to formulate strategies to utilize both facial recognition and biometrics for the digitization of airports in the country.

The findings of the current study also state how the combination of biometric authentication with facial recognition and the centralized database helps to heighten the security of travellers at the airport. However, it also acknowledges the challenges requiring refinement so that DigiYatra can be efficient and safe and implemented in airports nationwide.

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