International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Flying Into the Future: Digital Transformation in Ninoy Aquino International Airport Terminal III

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Abstract

Ninoy Aquino International Airport Terminal III has embraced digital transformation to modernize its operations and enhance passenger experiences. Digital transformation involves integrating advanced technologies that improve airport efficiency, security, and overall management. The background highlights the necessity for airport facilities and service upgrades to meet increasing customer demands while effectively addressing operational challenges. Key objectives include faster check-in processes, improved security measures, and the use of modern technology in resource allocation. Techniques employed include the implementation of biometric identification systems, the installation of automated baggage handling systems, and the establishment of real-time passenger information systems, among others. These technologies contribute to reducing waiting times, improving passenger flow, and enhancing airport security.

Keywords: Digital Transformation, Philippine Aviation, Digitization, Digitalization

1. INTRODUCTION

In today's fast-changing business world, digital transformation is crucial for companies worldwide. This shift is driven by forward-thinking leaders and rapid advancements in technology (Gürsel, Demir, & Rodoplu, 2023). While it offers opportunities for rapid growth, it also presents challenges that require skilled management. This study explores digital transformation in detail, highlighting six key practices essential for its success in organizations (Van Veldhoven & Vanthienen, 2022). These practices are designed to help businesses develop effective digital strategies and build integrated digital systems, enabling managers to navigate complex organizational changes in a constantly evolving digital environment. The research emphasizes the importance of strong digital leadership and organizational flexibility in achieving successful digital transformations. This is particularly critical in the public sector, where aligning leadership with digital strategies is key to implementing significant changes (AlNuaimi, Kumar Singh, Ren, Budhwar, & Vorobyev, 2022). Additionally, the study introduces a new framework that addresses gaps in existing models by considering societal impacts, evolving technology, and various driving forces. This comprehensive approach not only enhances our understanding but also provides a foundation for future research in digital

transformation.

The study also explores the transformative impacts of digital technologies on marketing strategies across various industries. It highlights emerging privacy concerns and regulatory implications that are reshaping consumer interactions and market dynamics (Quach, Thaichon, Martin, Weaven, & Palmatier, 2022). Simultaneously, it conducts a rigorous assessment of the Philippine aviation industry's readiness for Automatic Dependent Surveillance-Broadcast (ADS-B) technology, benchmarking it against established systems in the US and EU (Tan & Noroña, 2021). This analysis is particularly timely given the rapid growth in air travel across the Asia-Pacific region, emphasizing the critical role of technological readiness in enhancing aviation safety and efficiency. In the aviation sector, ongoing digital metamorphosis leverages cutting-edge technologies such as Virtual Reality (VR), Augmented Reality (AR), drones, and Artificial Intelligence (AI). These innovations signify a paradigm shift in operational methodologies and strategic approaches within the industry, promising not only enhanced operational efficiency but also sustainable innovation. By elucidating these transformative trends, the study offers invaluable insights into the evolving global aviation landscape, along with strategic pathways for navigating toward a digitally driven future (Haktanır, Kahraman, Şeker, & Doğan, 2023). While digital transformation presents unprecedented opportunities for growth and innovation on a global scale, its successful implementation hinges on effective leadership, strategic planning, and seamless integration of advanced digital technologies. This study contributes significantly to the academic discourse by outlining essential practices and frameworks necessary for navigating the complexities of digital transformation in today's dynamic business environment. As organizations adapt to these changes, they are poised to leverage digital advancements for sustainable growth and maintain a competitive advantage in the digital era.

1.1. Background of the Study

Digital transformation is revolutionizing industries globally, with the aviation sector being a prime beneficiary of technological advancements. Integrating digital technologies enhances operational efficiency, passenger experience, and security measures. This study focuses on the digital transformation initiatives at Ninoy Aquino International Airport (NAIA) Terminal 3, the largest and most modern terminal of the airport complex in Manila, Philippines.

NAIA, formerly known as Manila International Airport, serves as the main congestion, and operational inefficiencies. These challenges have underscored the need for comprehensive digital transformation to modernize the terminal and improve service delivery.

Digital transformation in airports encompasses the adoption of cutting-edge technologies such as artificial intelligence (AI), the Internet of Things (IoT), big data analytics, and cloud computing. These technologies are leveraged to optimize various aspects of airport operations. For example, Passenger Processing is streamlined through self-service kiosks, biometric verification, and automated baggage handling systems. The Passenger Experience is enhanced by providing personalized services, real-time information updates, and improved connectivity through mobile applications and digital signage. Additionally, security is improved through advanced surveillance, threat detection, and response systems to ensure passenger safety and comply with international security standards.

NAIA Terminal 3 has embarked on several digital transformation initiatives aimed at improving its services and infrastructure. It includes the Implementation of Self-Service Technologies, Biometric Systems, Wi-Fi

and Connectivity Enhancements, and Digital Information Systems. Despite the progress, NAIA Terminal 3 faces several challenges in its digital transformation journey. However, these challenges also present opportunities for growth and innovation. By addressing these obstacles, NAIA Terminal 3 can set a benchmark for other airports in the region and enhance its competitiveness on the global stage.

1.2. Theoretical Framework

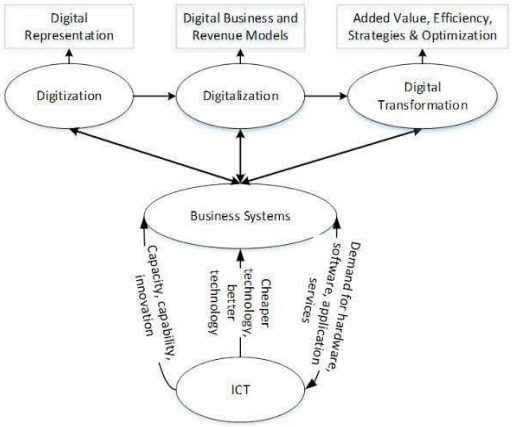


Fig 1: The Role of Digital Technologies in Educational Transformation

The paper "Digital Technologies in Educational Transformation," formulated by Deepanjal Shrestha and Adesh Khadka in 2022, explores how digital technologies are revolutionizing various sectors, including education, healthcare, and government offices. These technologies are transforming teaching-learning practices, governance, management, and student outreach. In Nepal, digital technologies are being employed to enhance teaching-learning and management models in universities and educational institutes. This work highlights the evolving dynamics of the educational landscape and the potential future impact of digital technologies on the educational sector, particularly in developing countries like Nepal.

1.3. Conceptual Framework

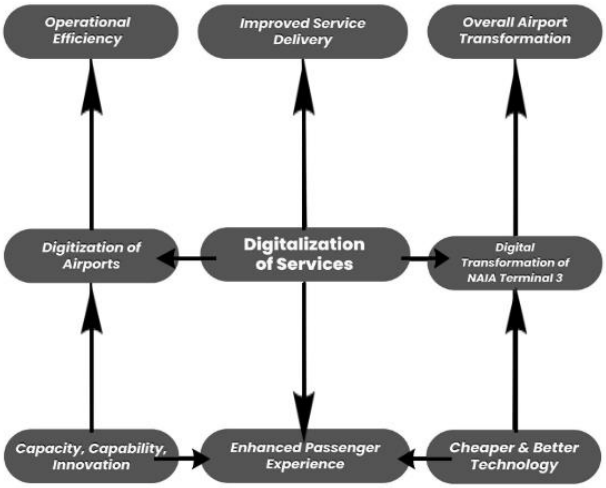


Fig. 2: Paradigm on Netiquette Practiced by the Aeronautical School for Compliance

Figure 2 presents the conceptual framework based on the Administrator Experiences Factors diagram by Georgetown University. The additional factor, netiquette, is highlighted in the center as it is the focus of this

study. Ninoy Aquino International Airport Terminal 3 (NAIA T3) is exploring the transition from conventional airport operations to a streamlined and technologically advanced system. This transformation begins with the digitization of airport operations, converting analog procedures into digital formats to enhance operational efficiency. Following this, the digitization of services employs digital tools and procedures to improve passenger service delivery. The primary objective of digital transformation at NAIA T3 is to fully integrate digital technologies, resulting in a complete restructuring of airport operations and services. The ICT infrastructure is crucial in this transformation, providing the essential technology and support for these digital initiatives. As a result, passenger experience is heightened through improved operational efficiency, service delivery, and innovative capabilities. Additionally, this transformation creates a demand for superior and more affordable technology, further driving innovation and efficiency in the airport's operations.

1.4. Statement of the Problem

The researchers seek to investigate the growing need for modernization in global air travel through digital transformation at Ninoy Aquino International Airport Terminal 3. The following specific issues will be addressed:

1. How can digital technologies streamline operations and reduce delays at the airport?
2. How can advanced security technologies improve safety while maintaining operational efficiency?
3. What digital tools and services can provide real-time information and personalized services to passengers?
4. What strategies can improve communication and coordination among airlines, ground services, and government agencies through digital platforms?
5. What are the economic challenges associated with initial investment with transformation to digital transformation at Ninoy Aquino International Airport Terminal 3?

1.5. Hypothesis

Implementing digital technologies at Ninoy Aquino International Airport Terminal 3 can streamline operations, reduce delays, and enhance safety through advanced security systems while maintaining efficiency. Digital tools and personalized services are expected to improve the passenger experience by providing real-time information. Enhanced communication and coordination among airlines, ground services, and government agencies via digital platforms could further improve operational efficiency. Despite significant initial economic challenges, the long-term benefits of digital transformation are anticipated to outweigh the costs, leading to increased efficiency and passenger satisfaction.

1.6. Significance of the Study

Airport: The digital transformation also aims to enhance environmental sustainability, meet industry standards, and reinforce the airport's commitment to excellence in service and innovation.

Passengers: The study seeks to improve passenger experience, operational efficiency, security, and sustainability through the implementation of digital technologies. This will result in a more seamless and enjoyable airport experience, fostering a positive image and encouraging repeat travel.

Airlines: Digital transformation can enhance operational efficiency, leading to cost savings and reduced turnaround times. Advanced technologies such as biometric screening, automated security checks, and real-time surveillance systems can improve safety and build trust among travelers. The study also highlights the environmental impact of digital transformation, focusing on energy-efficient systems, paperless operations, and optimized flight scheduling.

Employees: The transformation provides a more rewarding work experience, enabling employees to achieve more in less time. The digital changes offer a modern, dynamic work environment with advanced communication tools, real-time data access, and mobile technology, fostering a sense of empowerment and agility. Additionally, digital transformation supports improved work-life balance through remote work options and flexible hours, reducing stress and burnout.

Future Researchers: Future researchers may use the findings of this study to expand on existing knowledge and lay a foundation for further understanding of the subject. They can explore new perspectives and conclusions, identify areas needing additional research, and contribute to a broader understanding of the topic, potentially leading to new insights.

1.7. Review of Related Literature

According to Bruderer (2023), the process of employing digital tools by individuals, companies, and organizations to increase productivity, value, and efficiency is known as digitalization. For businesses, digitization is crucial as it can save time and open up new growth opportunities. By utilizing digital technologies, digitalization modifies an organization's internal procedures and creates new avenues for generating income and value. It involves converting existing analog information into digital formats and optimizing procedures using the latest tools and technologies.

According to TAVTechnologies (2023), the continuous advancement in technology has led to a paradigm shift in airport security in recent years. Breakthrough innovations have introduced state-of-the-art techniques that ensure security protocols while providing passengers with a seamless travel experience. Yan et al. (2018) note that the automation of passenger processing, including digital check-in, security screening, and boarding processes, has been shown to accelerate these activities and reduce bottlenecks. Automated systems improve the passenger experience and contribute to on-time departures by minimizing delays caused by processing inefficiencies.

Tingley (2019) highlights that the Guest Service Tool developed by Delta Airlines exemplifies how personalized service can enhance passenger experiences in the airline industry. This handheld device allows flight attendants to access detailed passenger profiles, enabling them to offer tailored assistance. For example, flight attendants can provide special help to passengers requiring assistance, inform frequent flyers of their benefits, and address specific needs such as food allergies without requiring passengers to repeat their requirements each time they fly.

According to Smith (2020), United Airlines uses a handheld device to provide flight attendants with carefully selected information about travelers, such as whether they are frequent flyers or have had a flight canceled. This allows flight attendants to tailor the in-flight experience accordingly. The technology also extends the customer experience beyond the aircraft. For instance, flight attendants can see which travelers have short connections and assist them in deplaning quickly to catch their next flight. Additionally, other airlines are customizing in-flight entertainment and meals by asking passengers to provide meal preferences before boarding. This approach offers a more personalized flying experience while helping airlines reduce waste by loading only the meals that have been selected.

Despite significant progress in recent years, the aviation sector still has much work to do. For example, while a majority of travel and hospitality executives acknowledge the importance of digital transformation, only 22% had fully migrated their operations to the cloud as of 2023. Looking ahead, the early stages of digital

transformation suggest that much innovation is still to come. The industry is expected to undergo rapid changes over the next decade, building on achievements in core business functions and continuing to evolve (Cusic, n.d.).

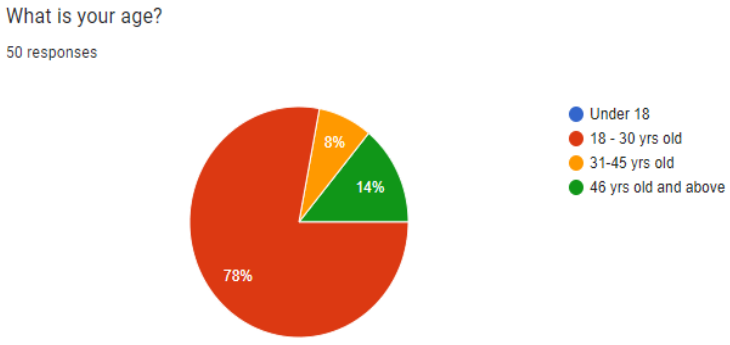
According to the International Air Transport Association (2018), biometric terminals and boarding gates are expected to become common features at airports worldwide. These technologies streamline the boarding process and enhance security by ensuring accurate and efficient passenger identification. The 2018 IATA Passenger Survey Report indicates strong passenger interest in using biometrics, with many travelers expressing a willingness to adopt this technology if it speeds up the boarding process.

Co (2024) reports that the Manila International Airport Authority (MIAA) will invest nearly P1 billion in acquiring an advanced visual docking guidance system (VDGS). This system will enhance the passenger experience by making aircraft turnarounds more efficient and improving flight safety. The VDGS will cover approximately 70 parking bays at NAIA and is slated for implementation next year. The system's acquisition cost will be reimbursed as part of the NAIA privatization concession.

Gray (2018) emphasizes the importance of establishing interoperability standards among diverse communication systems used by airlines, ground services, and government agencies. This ensures seamless information exchange during routine operations and emergency scenarios, thereby improving response times and operational resilience. Integrating unified digital platforms is crucial for enhancing communication efficiency across airport stakeholders. These platforms should support narrowband technologies like TETRA for reliable voice communication in noisy environments and broadband solutions for data-intensive applications. Critical services must be capable of handling high peak demands, providing ubiquitous coverage of the operational area, and ensuring guaranteed availability, reliability, and resilience. Extreme weather or unexpected critical situations, such as acts of terrorism, can severely degrade or even destroy commercial communications links and networks. Even if these networks remain available during such events, they often become overloaded and saturated as citizens use them to cope with the situation.

II. METHODOLOGY

2.1. Research Design



This study used a quantitative approach to assess the effectiveness and adaptability of the digital transformation efforts at Ninoy Aquino International Airport Terminal 3. Through surveys conducted via Google Forms, we gathered in-depth insights into how well these technological changes were functioning and how easily they could be adopted by both staff and passengers.

By utilizing this method, the researchers collected responses from a diverse range of participants, ensuring a broad spectrum of insights. The study's design was quantitative, focusing on the collection and analysis of numerical data. This approach allowed for the identification of patterns and averages, the making of predictions, the testing of causal relationships, and the generalization of results to larger populations (Bhandari, 2020). It facilitated a thorough evaluation of how these technological adjustments were perceived and their impact on airport operations.

2.2. Respondent

The target respondents of the researchers in this study were passengers from Ninoy Aquino Terminal III.

2.3. Settings

The 4th-year BS Air Transportation researchers conducted their study at an aeronautical school on Lombos Avenue, San Isidro, Parañaque City. In compliance with Midyear requirements, when the research was created, the researchers gathered at least fifty (50) people who had experienced or had been to Ninoy Aquino International Airport Terminal III. To collect data for this study, the researchers conducted online surveys targeting passengers of Ninoy Aquino International Airport Terminal III to further investigate and acquire information on how the digitalization of the airport affected their travel experiences.

2.4. Instrumentation

The researchers conducted a survey through Google Forms with the respondents. They used questionnaires as the instrument for this study. The questionnaires contained twenty-five (25) questions related to the study, and the respondents selected their answers to determine the experiences of passengers from Ninoy Aquino International Airport Terminal III. The information gathered from the respondents was used by the researchers to extract precise and succinct data that supported, validated, or contradicted the hypothesis.

2.5. Data Analysis

The researchers in this study examined the data using a number of statistical approaches. To begin, frequency and percentage were used to determine the experiences of passengers from Ninoy Aquino International Airport Terminal III. This approach provided a clear overview of the demographic characteristics of the sample. Mean and standard deviation were utilized to interpret the Likert scale responses. These measures enabled a deeper understanding of the passengers' decisions regarding their experiences at NAIA III, quantifying the central tendency and dispersion of their responses.

Number	Mean	Assessment
4	3.51 - 4.00	Strongly Agree
3	2.51 - 3.50	Agree
2	1.51 - 2.50	Disagree
1	1.00 - 1.50	Strongly Disagree

2.6. Ethical Considerations

The study ensured that all data gathered from the interviewees was handled with respect to their privacy. Participants received thorough information about the study's purpose, procedures, potential benefits and risks,

and their involvement in the research. Only the research group had access to the data, which was anonymized to protect the identities of the participants. Informed consent was secured from all participants before they provided any data for the study.

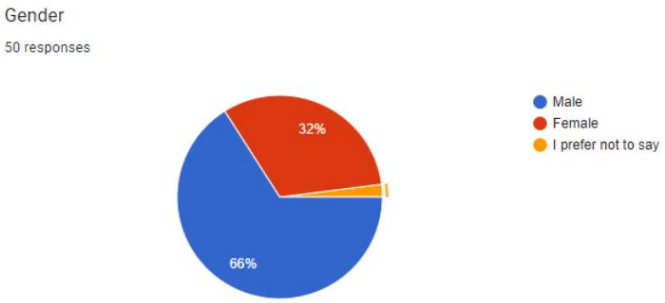
III. RESULT AND ANALYSIS

3.1. Results

This chapter presented the results of the survey, followed by a comprehensive analysis and interpretation of the collected data. The findings provided insight into the challenges associated with the digital transformation of NAIA Terminal 3, particularly regarding facility and safety enhancements, as well as terminal efficiency. The research aimed to evaluate the data and specifically addressed the following questions: (a) What were the effects of increasing digitalization at NAIA Terminal 3? (b) What specific challenges was NAIA Terminal 3 currently facing? (c) What were the prospects and potential growth of NAIA Terminal 3 through the utilization of digital platforms to improve communication and coordination? and (d) How did advanced security technologies compare to traditional methods in terms of leading to faster and more accurate threat detection?

3.2. Findings

Figure 1: A pie chart containing the percentage of the gender of the respondents.



Graph 3.1 illustrates that 66% of the respondents are Male, and 32% are Female, and 2% of the respondents Prefer not to say their gender. This data indicates that the majority of the respondents are Male

Figure 2: A pie chart containing the percentage Age of the respondents.

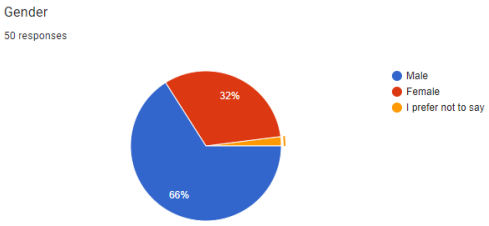
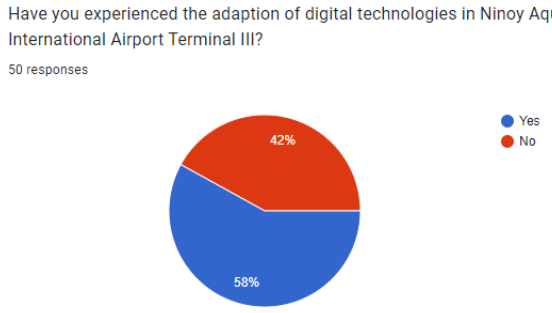


Figure 2 illustrates that 78% of the respondents are 18-30 years old, and 14% are 46 years old and above, and 8% are 31-45 years old. This data indicates that most of the respondents who are using the NAIA Terminal 3 are 18-30 years old.

Figure 3: A pie chart containing the experienced adaptation of digital technologies in NAIA Terminal



3.

Figure 3 shows that 58% of the respondents have experienced the adoption of digital technologies at NAIA Terminal 3.Meanwhile, 42% of the respondents have not experienced digital transformation at NAIA Terminal 3. This data can help determine the specific technology improvements that can be made at the terminal.

3.3. Table and Bar Graph SOP 1

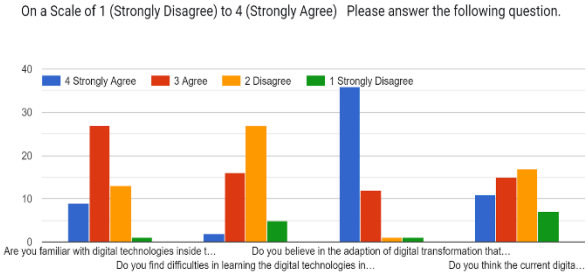


Table 3: The answers of respondents if they are familiar with digital technologies inside the airport If so, have you seen any impact on efficiency technology improvements that can be made at the terminal.

Choices	**Frequency**	**Percentage**
Strongly Agree	9	18%
Agree	27	54%
Disagree	13	26%
Strongly Disagree	1	2%
TOTAL:	**50**	**100%**

Table 1 shows that 9 respondents, or 18%, strongly agree, 27 respondents, or 54%, agree, 13 respondents, or 26%, disagree, and 1 respondent, or 2%, strongly disagree regarding their familiarity with digital technologies at NAIA Terminal 3.

Table 2: The answers of respondents if they find difficulties in learning the digital technologies inside the airport

Choices	Frequency	Percentage
Strongly Agree	2	4%
Agree	16	32%
Disagree	27	54%
Strongly Disagree	5	10%
TOTAL:	**50**	**100%**

Table 2 shows that 2 respondents, or 4%, strongly agree, 16 respondents, or 32%, agree, 27 respondents, or 54%, disagree, and 5 respondents, or 10%, strongly disagree regarding whether they find difficulties in learning the digital technologies inside the airport.

Table 3: The answers of respondents if they believe in the adoption of digital transformation that would enhance the operations and efficiency at the airport.

Choices	Frequency	Percentage
Strongly Agree	36	72%
Agree	12	24%
Disagree	1	2%
Strongly Disagree	1	2%
TOTAL:	**50**	**100%**

Table 3 shows that 36 respondents, or 72%, strongly agree, 12 respondents, or 24%, agree, 1 respondent, or 2%, disagrees, and 1 respondent, or 2%, strongly disagrees regarding their belief in the adoption of digital transformation to enhance operations and efficiency at the airport.

Table 4: The answers of the respondents if they think the current digital technologies are sufficient to handle the passenger traffic at Terminal III.

Choices	Frequency	Percentage
Strongly Agree	11	22%

Agree	15	30%
Disagree	17	34%
Strongly Disagree	7	14%
TOTAL:	**50**	**100%**

Table 4 shows that 11 respondents, or 22%, strongly agree, 15 respondents, or 30%, agree, 17 respondents, or 34%, disagree, and 7 respondents, or 14%, strongly disagree regarding whether they think the current digital technologies are sufficient to handle the passenger traffic at Terminal III.

Table 5: The answers of respondents if they think features in airports like mobile apps would be useful to reduce wait times and improve your overall experience at NAIA Terminal 3.

Choices	**Frequency**	**Percentage**
Strongly Agree	33	66%
Agree	15	30%
Disagree	2	4%
Strongly Disagree	0	0%
TOTAL:	**50**	**100%**

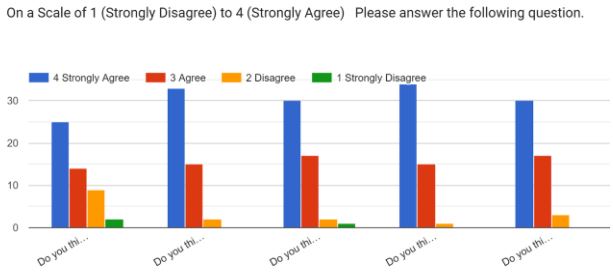
Table 5 shows that 33 respondents, or 66%, strongly agree, 15 respondents, or 30%, agree, 2 respondents, or 4%, disagree, and 0 respondents, or 0%, strongly disagree regarding whether they think features in airports, such as mobile apps, would be useful for reducing wait times and improving the overall experience at NAIA Terminal 3.

Table 6: The answer of respondents if they think digital concierge service would be useful to provide personalized travel assistance and updates at NAIA Terminal 3 in reducing delays.

Choices	**Frequency**	**Percentage**
Strongly Agree	30	60%
Agree	17	34%

Disagree	3	6%
Strongly Disagree	0	0%
TOTAL:	**50**	**100%**

Table 6 shows that 30 respondents, or 60%, strongly agree, 17 respondents, or 34%, agree, 3 respondents, or 6%, disagree, and 0 respondents, or 0%, strongly disagree regarding whether they think a digital concierge service would be useful for providing personalized travel assistance and updates at NAIA Terminal 3 to reduce delays.



3.4. Table and Bar Graph SOP 2

Table 7: The answer of the respondents if they think implementing advanced security technologies leads to faster and more accurate threat detection compared to traditional methods.

Choices	Frequency	Percentage
Strongly Agree	35	70%
Agree	13	26%
Disagree	2	4%
Strongly Disagree	0	0%
TOTAL:	**50**	**100%**

Table 7 shows that 35 respondents, or 70%, strongly agree, 13 respondents, or 26%, agree, 2 respondents, or 4%, disagree, and 0 respondents, or 0%, strongly disagree regarding whether they think implementing advanced security technologies leads to faster and more accurate threat detection compared to traditional methods.

Table 8: The answers of the respondents does advance security technologies help in reducing human error and improving response times during security incidents.

Choices	Frequency	Percentage
Strongly Agree	29	58%
Agree	21	42%
Disagree	0	0%
Strongly Disagree	0	0%
TOTAL:	**50**	**100%**

Table 8 shows that 29 respondents, or 58%, strongly agree, 21 respondents, or 42%, agree, 0 respondents, or 0%, disagree, and 0 respondents, or 0%, strongly disagree regarding whether advanced security technologies help in reducing human error and improving response times during security incidents.

Table 9: The answers of the respondents if they think facial recognition would be helpful for security and boarding at NAIA Terminal 3 in reducing delays.

Choices	Frequency	Percentage
Strongly Agree	25	50%
Agree	14	28%
Disagree	9	18%
Strongly Disagree	2	4%
TOTAL:	**50**	**100%**

Table 9 shows that 25 respondents, or 50%, strongly agree, 14 respondents, or 28%, agree, 9 respondents, or 18%, disagree, and 2 respondents, or 4%, strongly disagree regarding whether they think facial recognition would be helpful for security and boarding at NAIA Terminal 3 in reducing delays.

Table 10: The answers of the respondents if they think automated security screening systems would be useful in enhancing safety and reducing wait times at NAIA Terminal 3.

Choices	Frequency	Percentage
Strongly Agree	30	60%
Agree	17	34%
Disagree	2	4%
Strongly Disagree	1	2%
TOTAL:	**50**	100%

Table 10 shows that 30 respondents, or 60%, strongly agree, 17 respondents, or 34%, agree, 2 respondents, or 4%, disagree, and 1 respondent, or 2%, strongly disagree regarding whether they think automated security screening systems would be useful in enhancing safety and reducing wait times at NAIA Terminal 3.

Table 11: The answers of the respondents would be useful to receive digital notifications about security wait times and customs clearance from government agencies to better plan your time at NAIA Terminal 3.

Choices	Frequency	Percentage
Strongly Agree	33	66%
Agree	16	32%
Disagree	1	2%
Strongly Disagree	0	0%
TOTAL:	**50**	**100%**

Table 11 shows that 33 respondents or 66% strongly agree, 16 or 32% agree, 1 or 2% disagree, 0 or 0% strongly disagree regarding whether it would be useful to receive digital notifications about security wait times and customs clearance from government agencies to better plan their time at NAIA Terminal 3.

3.5. Table and Bar Graph SOP 3

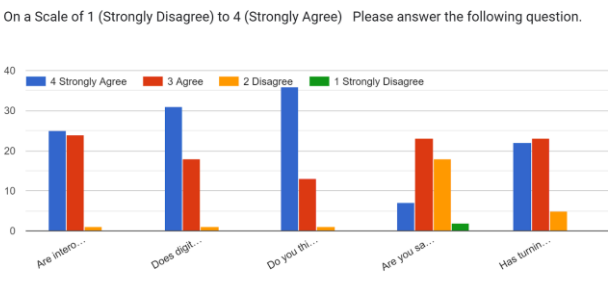


Table 12: The answer of the respondents is that digital mobile applications that offer real-time updates on flight statuses, gate changes, and baggage claim information enhance the overall travel experience for passengers.

Choices	Frequency	Percentag

		e
Strongly Agree	38	76%
Agree	10	20%
Disagree	2	4%
Strongly Disagree	0	0%
TOTAL:	**50**	**100%**

Table 12 shows that 38 respondents, or 76%, strongly agree, 10 respondents, or 20%, agree, 2 respondents, or 4%, disagree, and 0 respondents, or 0%, strongly disagree regarding whether digital mobile applications that offer real-time updates on flight statuses, gate changes, and baggage claim information enhance the overall travel experience for passengers.

Table 13: The answers of the respondents are digital wayfinding tools that offer interactive maps and directions within the airport to help passengers navigate more efficiently and locate amenities.

Choices	**Frequency**	**Percentage**
Strongly Agree	31	64%
Agree	18	36%
Disagree	1	2%
Strongly Disagree	0	0%
TOTAL:	**50**	**100%**

Table 13 shows that 31 respondents, or 64%, strongly agree, 18 respondents, or 36%, agree, 1 respondent, or 2%, disagrees, and 0 respondents, or 0%, strongly disagree regarding whether digital wayfinding tools that offer interactive maps and directions within the airport help passengers navigate more efficiently and locate amenities.

Table 14: The answer of the respondent if they are satisfied with the availability of digital information and services at NAIA Terminal 3.

Choices	**Frequency**	**Percentage**
Strongly Agree	**7**	14%

Agree	**23**	46%
Disagree	**18**	36%
Strongly Disagree	**2**	4%
TOTAL:	**50**	**100%**

Table 14 shows that 7 respondents, or 14%, strongly agree, 23 respondents, or 46%, agree, 18 respondents, or 36%, disagree, and 2 respondents, or 4%, strongly disagree regarding their satisfaction with the availability of digital information and services at NAIA Terminal 3.

Table 15: The answer of the respondents has turned information into digital formats and changed how you use airport services.

Choices	**Frequency**	**Percentage**
Strongly Agree	22	44%
Agree	23	46%
Disagree	5	10%
Strongly Disagree	0	0%
TOTAL:	**50**	**100%**

Table 15 shows that 22 respondents, or 44%, strongly agree, 23 respondents, or 46%, agree, 5 respondents, or 10%, disagree, and 0 respondents, or 0%, strongly disagree regarding whether turning information into digital formats changes how they use airport services.

Table 16: The answer of the respondents would be useful for real-time updates from ground services (e.g., baggage handling, shuttle services) on a digital platform to improve your travel experience at NAIA Terminal 3?

Choices	**Frequency**	**Percentage**
Strongly Agree	36	72%
Agree	12	24%
Disagree	1	2%
Strongly Disagree	1	2%
TOTAL:	**50**	**100%**

Table 16 shows that 36 respondents, or 72%, strongly agree, 12 respondents, or 24%, agree, 1 respondent, or 2%, disagrees, and 1 respondent, or 2%, strongly disagrees regarding whether real-time updates from ground services (e.g., baggage handling, shuttle services) on a digital platform would improve their travel experience at NAIA Terminal 3.

Table 17: The answer of the respondents would be useful for digital notifications to inform you about flight changes and updates at NAIA Terminal 3.

Choices	**Frequency**	**Percentage**
Strongly Agree	37	74%
Agree	12	24%
Disagree	0	0%
Strongly Disagree	1	2%
TOTAL:	**50**	**100%**

Table 17 shows that 37 respondents, or 74%, strongly agree, 12 respondents, or 24%, agree, 0 respondents, or 0%, disagree, and 1 respondent, or 2%, strongly disagrees regarding whether digital notifications would be useful for informing them about flight changes and updates at NAIA Terminal 3.

Table 18: The answer of the respondents if they think it is important to have digital customer support services, such as chatbots or instant messaging, at NAIA Terminal 3.

Choices	**Frequency**	**Percentage**
Strongly Agree	37	74%
Agree	11	22%
Disagree	1	2%
Strongly Disagree	1	2%
TOTAL:	**50**	**100%**

Table 18 shows that 37 respondents or 74% strongly agree, 11 or 22% agree, 1 or 2% disagree, 1 or 2% strongly disagree regarding whether it is important to have digital customer support services, such as chatbots or instant messaging, at NAIA Terminal 3.

3.6. Table and Bar Graph SOP 4

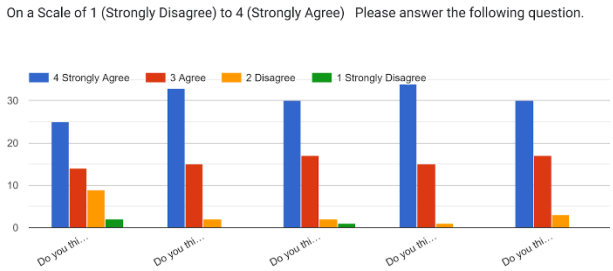


Table 19: The answers of the respondents if they believe that utilizing digital platforms can enhance communication and coordination among airlines, ground services, and governmental agencies.

Choices	Frequency	Percentage
Strongly Agree	36	72%
Agree	13	26%
Disagree	1	2%
Strongly Disagree	0	0%
TOTAL:	**50**	**100%**

Table 19 shows that 36 respondents, or 72%, strongly agree, 13 respondents, or 26%, agree, 1 respondent, or 2%, disagrees, and 0 respondents, or 0%, strongly disagree regarding whether they believe that utilizing digital platforms can enhance communication and coordination among airlines, ground services, and governmental agencies.

Table 20: The answers of the respondents are interoperability standards among communication systems crucial for seamless information exchange during operations and emergencies

Choices	Frequency	Percentage
Strongly Agree	25	50%
Agree	24	48%
Disagree	1	2%
Strongly Disagree	0	0%
TOTAL:	**50**	**100%**

Table 20 shows that 25 respondents, or 50%, strongly agree, 24 respondents, or 48%, agree, 1 respondent, or 2%, disagrees, and 0 respondents, or 0%, strongly disagree regarding whether interoperability standards

among communication systems are crucial for seamless information exchange during operations and emergencies.

Table 21: The answers of the respondents if they think that the use of digital platforms for communication enhances your overall travel experience at the airport.

Choices	Frequency	Percentage
Strongly Agree	34	68%
Agree	15	30%
Disagree	1	2%
Strongly Disagree	0	0%
TOTAL:	**50**	**100%**

Table 21 shows that 34 respondents or 68% strongly agree, 15 or 30% agree, 1 or 2% disagree, 0 or 0% strongly disagree that the use of digital platforms for communication enhances their overall travel experience at the airport.

3.7. Table and Bar Graph SOP 5

Table 22: The answers of respondents if they believe that investing in digital transformation at NAIA Terminal 3 is necessary for its future competitiveness.

Choices	Frequency	Percentage
Strongly Agree	37	74%
Agree	12	24%
Disagree	1	2%
Strongly Disagree	0	0%
TOTAL:	**50**	**100%**

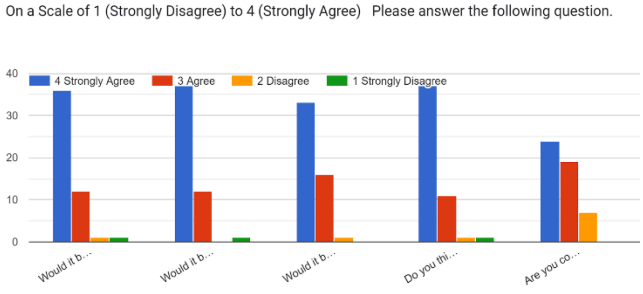


Table 22 shows that 37 respondents, or 74%, strongly agree, 12 respondents, or 24%, agree, 1 respondent, or 2%, disagrees, and 0 respondents, or 0%, strongly disagree regarding whether they believe that investing in digital transformation at NAIA Terminal 3 is necessary for its future competitiveness.

Table 23: The answers of the respondents if they think investing more on technology will enhance passenger experience.

Choices	Frequency	Percentage
Strongly Agree	36	72%
Agree	13	26%
Disagree	1	2%
Strongly Disagree	0	0%
TOTAL:	**50**	**100%**

Table 23 shows that 36 respondents, or 72%, strongly agree, 13 respondents, or 26%, agree, 1 respondent, or 2%, disagrees, and 0 respondents, or 0%, strongly disagree regarding whether they think investing more in technology will enhance the passenger experience.

Table 24: The answers of the respondents if they think it is important for NAIA Terminal 3 to continue investing in digital transformation to stay competitive with other international airports.

Choices	Frequency	Percentage
Strongly Agree	37	74%
Agree	13	26%
Disagree	0	0%
Strongly Disagree	0	0%
TOTAL:	**50**	**100%**

Table 24 shows that 37 respondents or 74% strongly agree, 13 or 26% agree, 0 or 0% disagree, 0 or 0% strongly disagree whether they think it is important for NAIA Terminal 3 to continue investing in digital transformation to stay competitive with other international airports.

Table 25: The answer of the respondents is that you are concerned about the potential increase in costs (e.g., ticket prices, airport fees) associated with digital transformation at NAIA Terminal 3.

Choices	Frequency	Percentage
Strongly Agree	24	48%
Agree	19	38%
Disagree	7	14%
Strongly Disagree	0	0%
TOTAL:	**50**	**100%**

Table 25 shows that 24 respondents or 48% strongly agree, 19 or 38% agree, 7 or 14% disagree, 0 or 0% strongly disagree if they are concerned about the potential increase in costs (e.g., ticket prices, airport fees) associated with digital transformation at NAIA Terminal 3.

IV. DISCUSSION

4.1. Conclusions

The survey offers a comprehensive view of respondents' opinions on the digital transformation of NAIA Terminal 3, providing insights into both its current status and future potential. Specifically, 72% of respondents believe that digitization can enhance operations and efficiency, while 70% are concerned that advanced security systems will improve threat detection speed and accuracy compared to traditional methods. Additionally, 76% of participants emphasize the importance of digital mobile applications in enhancing the travel experience by providing real-time updates.

This highlights the importance for NAIA Terminal 3 to continue investing in digital transformation to remain competitive with other international airports. However, approximately 48% of respondents express concerns about potential cost increases associated with this trend. Despite this, the prevailing preference for automated security systems, digital notifications, and interactive wayfinding tools underscores the significance of technology integration in shaping the future of airport operations.

The survey reveals a clear consensus among respondents on the necessity and benefits of digital transformation at NAIA Terminal 3. The insights gained from this research underscore the importance of continued investment in digital technologies to enhance passenger experience, operational efficiency, and overall competitiveness in the global aviation landscape.

4.2. Recommendations

Based on the discussed conclusions, the recommendations are as follows:

Digital transformations are under increasing pressure to deliver the desired airport experiences to attract more passengers and airlines in the current competitive environment. Passengers are more likely to remain loyal to the same airport rather than switch to a new one when they receive consistent and reliable services. An airport's ability to enhance its services through digital transformation is crucial.

This includes improvements in procedural efficiency and service variety, such as minimizing flight delays, ensuring safer operations, increasing efficiency, and reducing miscommunications. These factors will also impact the quality of the airport's future offerings.

1. **Airports** must prioritize service quality and safer operations by implementing facial recognition technology to detect passengers' emotions. They should also adopt biometric authentication to prevent fraud. Enhancing service quality and ensuring safety are crucial for providing a better passenger experience.
2. **Airlines** should focus on effective baggage handling and improved customer relations by prioritizing service quality and investing in employee training. To minimize instances of improper handling and increase passenger satisfaction, airlines need to regularly assess and improve their operational strategies.
3. **Passenger processing and flow** can be improved by enabling self-check-in, printing boarding passes, and tagging luggage, which will reduce queues and wait times. This approach will lead to a more seamless and enjoyable airport experience, fostering customer satisfaction and encouraging repeat travel.
4. **Enhancing employees'** work-life balance through remote work options and flexible schedules can reduce stress and burnout, while fostering a sense of empowerment and agility. Coupled with communication tools, real-time data access, and mobile technology, this creates a more fulfilling work environment, allowing employees to accomplish more in less time.
5. **Future researchers** should explore the long-term impact of digital technologies on airport operations, the integration of emerging technologies, and the development of tailored solutions for various types of airports.

   By focusing on advanced biometric solutions, facial recognition, self-check-in, luggage tagging, and cybersecurity, researchers can contribute to ongoing improvements in operational efficiency and passenger experience.

By implementing these recommendations, the airline industry can achieve a smoother transition, enhance customer satisfaction, and improve the overall travel experience for passengers.

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