



IMPACT OF APPLYING THE ARTIFICIAL INTELLIGENCE
IN AIRPORTS' OPERATIONS
(APPLIED IN CAPITAL INTERNATIONAL AIRPORT)

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Abstract:

The traveler's experience expresses what the traveler experiences and feels emotionally during his travel in all its stages, and here we will focus on developing this part of this experience that airports are interested in through the application of artificial intelligence. The airport passenger experience begins with choosing the right airport of departure and arrival. The travel industry may benefit more from artificial intelligence (AI), which has the potential to reshape the industry. Advances in artificial intelligence and aviation have led to the emergence of smart airports. The purpose of this research is to consider the importance of using artificial intelligence in international airports to develop the travel experience, especially the Capital International Airport (CCE), which is located in Egypt. The study mainly includes qualitative analysis of online interviews with experts in aviation agencies. Services through AI-powered systems enable smart airports to increase robustness, efficiency, and control.

Keywords: Artificial intelligence, Egyptian international airports, Capital International Airport, Service automation, Smart airports, Intelligence operating system.

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1. INTRODUCTION

Technology has gradually made way for itself in the tourism industry, and reduced the processes that are carried out manually. As the tourism industry has always been an early technology adopter, it has welcomed AI with open arms (Mitchell, 2019). AI is one of the branches of computer science, and one of the basics on which the technology industry is based in this era (Froese & Taguchi, 2019). And it can be defined as the ability of machines and computers to perform human tasks. The purpose of AI is to gain access to systems, to act in the way that a person does with accurate understanding and speed of action. These systems will offer their users' increased services of education, guidance and accurate interaction (Pencarelli, 2020).

As a result, the concept of smart cities and smart airports was created. Smart airports emerged as a result of widespread adoption of Internet of Things (IOT) and Industry 4.0, as well as increased commercial flight frequency around the world. Modern airports are outfitted with smart "things" that improve service reliability, reduce human error in critical areas such as runway maintenance (Dewi, 2020), to ensure a high quality of experience for customer's. Smart airports rely on connected technologies such as AI to support airport operations which include all processes involved in making the

airport experience as pleasant as possible for all passengers (Alansari, 2019).

AI and its cognitive data interpretation technologies can streamline, and automate analytics, machine maintenance, customer service, and a wide range of other internal processes and tasks to provide the best experience for the traveler (Khadonova et al., 2020). AI plays a significant role in Airport itself; cost, design cycle time reduction, copying, prototyping, optimization, storage, production and product renewal. All of which are expected to drive further progress in the aerospace industry over the next 15 years. AI advancements can assist aerospace companies in implementing their own manufacturing process (Vinod, 2021). AI is now providing not only the best customer experience through automation but also self-service solutions.

The employee workflow is being optimized and predictive aircraft maintenance is ensuring greater air safety in order to increase the safety of passengers. Smart data usage also enables aerospace companies to make informed pricing and market positioning decisions. AI integration in the aerospace industry ensures cost-effectiveness and safety (Narongou & Sun, 2021). The aviation industry heavily relies on data derived from extensive research and production of its products and services. AI has played a significant role in transforming the journey for

travelers through the development of the aerospace industry by providing valuable information that would otherwise be difficult to obtain using traditional methods (He et al., 2019).

Egypt is home to 27 civilian airports including international and domestic airports; Egypt has 14 international airports. Cairo International Airport is the largest (CAI). CAI is Africa's second busiest airport, trailing Johannesburg, because of its location between Africa, the Middle East, and Europe (Mohamed et al., 2018). CAI has already used AI biometrics technology to recognize employees' faces. The distinction in CCE Airport and its well-equipped infrastructure, on the other hand. Egypt's focus is now on the new capital airport (Abdelaziz, 2010). This can make use of cutting-edge technologies such as AI CCE airport is Egypt's primary international gateway to the country's new capital. It is about 45 kilometers east of Cairo and was at the same time as the Sphinx International Airport (SPX) to the west (Njoya & Ragab, 2022).

This study implies qualitative analysis mainly the case study method. The purpose of this study is to provide comprehensive view of AI technology at CCE airport and its role in developing the experience of travelers at airports through contributing to identifying challenges and solutions and raising awareness of this technology to apply AI technology at CCE airport (Maxwell, 2021). (Maxwell, 2021).

2. Literature Review

2.1. The Technology in Aviation Industry

Aviation technology is a broad field that encompasses many different aspects of the equipment. Hardware and software used in flight operations, flight training, aircraft maintenance, aircraft security and airports. Aviation technology is frequently more advanced than technology developed for other industries (Li et al., 2021). Over the years, a wide range of technological developments and innovations have been integrated into the aviation industry. These advancements have been made to improve the aviation industry's functionality, ease of operation, and safety and the aim is to reduce hassles for passengers, speed up check-in and increase safety. (Alam, 2016). In its recent report on the Airline Industry's Future in 2035. Cyber security, robotics, automation, 3D printing, new manufacturing techniques, virtual reality, augmented reality, IoT, big data, and new aircraft designs have been identified as the future of the global aviation industry (Lan et al, 2017).

Society, Environment, Politics, Economy, and Technology are the five major drivers of change in the aviation industry. While societal, environmental, political, and economic factors are difficult to control, technology is quickly becoming the aviation

industry's primary concern (Fuad, 2021). With alternative futuristic modes of transportation such as the Super Loop and the growing importance of some of the most frequent technologies e.g., Smart Airports via Digitization, IoT and Cloud Technology, AI and ML, and Advanced Self-Service and Biometrics (Barenji et al., 2021)

Many airports have already revolutionized the check-in process in order to reduce human-to-human contact (Efthymiou et al., 2022). In many airports today, automated kiosks have replaced traditional check-in desks. And digital signage guides customers through the boarding process. Security clearance and advanced object and body scanning technology, paperless boarding passes (Liming, 2022), and an automated boarding process is an example of increased digitization. In a similar vein, the aforementioned connected devices will serve as the foundation for AI algorithms. Sift through trillions of terabytes of data in order to uncover meaningful operational insights.

Among other things, retail spending, security processes, travel patterns, bathroom facilities, parking, and check-in habits. Such a broad analysis can only be conducted concurrently with the help of AI-based programs and machine learning algorithms. According to a new market study, artificial intelligence in the aviation market will grow at a CAGR of 46.4% by 2023 (Yang & Yang, 2021). Artificial intelligence is being used to provide passengers with a personalized traveling experience in order to maximize customer satisfaction. The digital interactions between airlines and passengers are being personalized, optimized, and scaled up using artificial intelligence. Artificial intelligence and Machine learning applied to passenger social sentiment is assisting the airline industry in curating their services based on the needs of the passengers (Fuad et al., 2021).

Also, in aviation trends; biometrics will be a critical component of smart airports in the form of advanced self-service and biometrics technology. Facial recognition, fingerprint authentication, and retinal scanning will become the standard method of verification (Khan & Efthymiou, 2021). The integration of biometric systems for border control, airport check-ins, onboarding, and migration formalities will soon make the entire verification process paperless. This will be extended to the baggage claim process, allowing passengers to track their luggage in real-time.

Furthermore, the growing use of artificial intelligence (AI) to improve customer service will open up new opportunities for market growth (See Figure 1). Moreover improved operational efficiency in the aviation industry with the help of AI will act as a

market driver and further boost new opportunities during the forecast period mentioned above (Brandoli et al., 2021). Surveillance, flight operations, virtual assistance, smart logistics, training, smart

maintenance, dynamic pricing, manufacturing and others are some of the AI application in aviation areas that will create more opportunities in the future (De Simone, 2021).



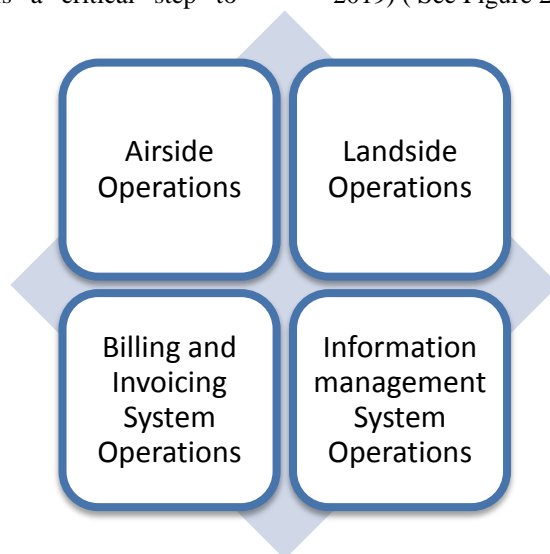
Source: Journal of the Academy of Marketing Science (2021).

Figure 1: Data Bridge Market Research, artificial intelligence (AI) in the aviation market will grow at a CAGR of 46.3% from 2022 to 2029, reaching USD 9,995.84 million by 2029.

2.2. Artificial Intelligence (AI) Technology in Airport :

Airport efficiency is a critical component of today's air transportation system. The increasing number of flights and passengers puts a strain on airport operations. This must maintain punctuality, performance, and safety (Ivanov & Webster, 2017). Adopted robots, artificial intelligence, and service automation by travel, tourism, and hospitality companies to a cost-benefit analysis. Integrated airport operations management with an Airport Operations Centre (APOC) is a critical step to

optimize the use of all airport resources and facilities, reducing aircraft turnaround times and flight delays. Also, ensuring airport capacity reliability during peak periods and in all weather conditions. Every aspect of an airport's operational life has a significant impact on any passenger's airport experience (Naumov, 2019). Long delays, insufficient security clearances, and general chaos could result from malfunctioning airport operations. It will also endanger the safety of aircraft, passengers. Airport operations are commonly divided into four categories (Lukanova & Ilieva, 2019) (See Figure 2).



Source: Journal of Air Transport Management (2021).

Figure 2: Four Airport's Operations Categories.

2.2.1. AI in Airside Operations

Artificial intelligence (AI) technologies are advantageous in all parts of airport operations. There are many different facets to airside operations. For example, air safety and airplane maintenance, as well as fuel efficiency optimization (McDonald et al., 2000). Airlines literally suffer huge expenditures due to delays and cancellations, which include maintenance costs and compensation for passengers stranded at airports so the intervention of artificial intelligence was to save travelers by reducing waiting time and sudden cancellation of flights due to weather conditions. Reducing the number of deaths due to accidents (Atak & Kingma, 2011) creating a platform to aid maintenance teams with historical and real-time data. Making technical decisions more swiftly as well. The Synapse MX program analyses data and metadata related to observed maintenance activity (Dalkilic, 2017).

AI technology enables engineers to quickly assess a situation. The advancements in AI did not stop yet. Applying AI techniques in conjunction with a physical understanding of the environment can significantly improve prediction skills for multiple types of high-impact weather (Chantry et al., 2021). AI is widely regarded as a significant contribution to the rapidly expanding field of computational sustainability. This will help with storm duration forecasting and aviation turbulence forecasting. In addition, one of the most important parameters for aerospace Original Equipment Manufacturers (OEM) is fuel efficiency, which can be optimized with the help of AI. Automation also aids in the improvement of flight path control, system monitoring displays and diagnostic assistance systems. AI will increase the level of safety and security of passengers by predicting what will happen.

With big data generated by airlines, schedulers are not left to fend for themselves. For example, maintenance and passenger data, or data from onboard sensors (Nascimento et al., 2019). Employees rely on software that combines data from various sources to provide a complete picture of daily operations. Such software integrates predictive models with an airline operations management system. Some crew management solutions address the fatigue risk that pilots face (Klås & Vollmer, 2018).

2.2.2 Landside operations

After the Corona pandemic, the benefits of artificial intelligence have emerged, especially in this part of the airport, tracking the health of passengers by integrating with wearable technologies and recommending safe travel areas. There are many potential ways we can see in the coming years passengers and travel companies using AI to make

the journey efficient and seamless while keeping customer satisfaction at the highest levels. Employees provide customer service by overseeing the airport's terminals, concourses, roadways and properties. They are also in charge of the day-to-day operations within the terminals and parking decks. This category includes terminal operations. Smart Baggage is reshaping the future of luggage travel (Miskolczi et al., 2021). The technology recognizes bags using rapid computer vision and AI in a system that will significantly streamline the passenger journey. Also, Fingerprinting, facial recognition and retinal scans are expected to be increasingly used for airport security.

Researchers at the University of Manchester in the United Kingdom recently developed an AI system capable of measuring a person's individual gait or walking pattern when he steps on a pressure pad (Oki et al., 2021). iBrderCtrl project involves the testing of an AI program to speed up border crossings. A virtual border guard asks passengers questions while a webcam analyses their facial expressions. If the passenger is deemed to be lying, further biometric information is taken before they are passed on to a human officer for review.

Dabai, the robot, may appear cute and pleasant, but it can detect drugs and explosives. In addition, keep an eye on low temperatures, inspect jewelry for dangerous chemical warfare agents, and examine produce (Idris et al., 2020). AI-powered self-driving automobiles run purely on solar or electrical energy. This will help the airport improve passengers' experience in day-to-day operations. Improvements in both land transit and air travel (Grzywaczewski, 2017).

Also, an autonomous tractor to transport baggage between the baggage sorting area and the aircraft. The testing of this baggage tractor in real-world conditions brings us one step closer to creating the smart airport of the future (Kiss, 2019). Air transport players hope to improve baggage flow performance and ramp safety at airport hubs by deploying smart and autonomous vehicles. By automating traffic flows, operators can focus on decision-making and management tasks, saving time and increasing efficiency (Hong et al., 2021).

2.2.3. AI in Airport Billing and Invoicing System Operations

Because passengers perceive the value of a product differently, AI's purpose in billing system operations is to sell the appropriate product to the right consumer at the right time and through the right channel (Buchanan & Wright, 2021). As a result, the price they are willing to pay differs per group. Targeting where they belong and managing seats at the moment of purchase keeps the airline competitive

while remaining passenger-friendly. When it comes to travel marketing, AI contacts the passenger at various points along the route.

Artificial intelligence and machine learning are built into modern travel marketing software and can do everything from understanding a passenger's preferences to estimating prices for flights on a given day. Airline travel marketing requires more than competitive pricing in the face of fierce competition for customers (Bushan, 2019). Delivering a great passenger experience and having a high brand perception is crucial here because, unlike other travel companies, airlines require a greater sense of security and knowledge than any other company (Leung, 2019). Also, strategies such as loyalty and miles programs can be effective in encouraging passengers to book through your direct channels rather than through other distribution channels such as online travel agencies (Bawack et al., 2021).

2.2.4. AI in Information Management System Operations

Because of the airport industry's unusual complexity and the enormous macroeconomic, social, and environmental effects of aviation. The scope of an Airport Management Information System (AMIS) extends much beyond usual requirements within a larger region. Data security is the protection of systems and information from serious dangers such as cyber warfare, terrorism and espionage. AI-enabled security software is intended to notify administrators automatically when harmful behavior happens or security policies are breached. In addition, AI as software, such as Arbot Solutions' Coseer, uses algorithms to process natural language. In addition, unstructured text can be used to speed up and streamline customer care employees' procedures (Newbold, 2020).

AI can assist airlines in classifying their customer emails and extracting information from those emails. They can automate some of the routine processes, such as information about lost baggage (Bieliatynskyi, 2018). In this regard, airlines that use data analysis to learn about airport and flight experience pain points can improve customer service by using AI. Market research and feedback analysis enabling airlines to make educated decisions while meeting customer requirements. Through the Automated Neural Intelligence Engine, a business analytics platform (ANIE) (Oliveira, 2021). Data review, categorization, visualization and sentiment analysis are all features of the engine. As a result, the engine handles a lot of manual and time-consuming information processing, allowing humans to focus on more complex tasks.

These applications of AI dimensions at international airports are crucial when it comes to the new international airports to compete in the aviation market. In this vein, the study tends to evaluate the privilege of applying these AI applications to a vital airport in EGYPT, namely Capital international airport (CCE). In the following sections, we introduce the CCE as the study context by employing case study methodology to fathom the essence behind AI applications in emerging international airports. Moreover, we investigate whether the applications of such AI dimensions will benefit the CCE airport. We examine it using comparative/checklist techniques with the leading global airports. We aim from the following section to provide airport managers – especially CCE or the new international airports which have the same dimensions of CCE – with direction to apply AI. In turn, this will benefit both the airports and the travelers.

3. METHODOLOGY

As participants must provide responses with fewer limits and semi-structured interviews allow for more inductive reasoning and freedom. Here is the interviewing process: (interview selection, interview procedure, interview questions)

3.1 Interview selection

The study selected millennial pilots and executives to serve as volunteer candidates. Millennial pilots and executives were picked because they are digital natives who have grown up with technology in their own life. Furthermore, millennial have been influenced by technology from an early age and have developed excellent abilities in digital technologies, demonstrating the increased need for regular communication.

3.2. Interview Techniques

In all, 11 technology-experienced participants (see Table 1) were chosen to engage in online interviews via various online platforms, based on the online platforms most convenient for participants (e.g., Zoom, Microsoft Teams, and Google Meet). The reason for conducting online interviews rather than in-person interviews is the considerable distance between the participants and the interviewer. The interviews lasted between 30 and 45 minutes. Table 1 highlights the profiles of the participants, including their gender, age, Online Interview Platform, and duration. The genders of the participants were largely balanced, with 5 females (45.5%) and 6 males (54.5%).

Informant No.	Gender	Age	Online Interview Platform Type	Years of Experience
1	Man	27	Zoom	4
2	Woman	35	Zoom	6
3	Man	28	Google meet	3
4	Man	30	Microsoft teams	5
5	Woman	25	Zoom	2
6	Man	21	Google meet	2
7	Man	26	Zoom	4
8	Woman	26	Microsoft teams	4
9	Woman	29	Zoom	6
10	Man	25	Google meet	5
11	Woman	32	Google meet	8
12	Man	26	Google meet	5

3.2.1. The Interview Questions

The study uses adopted and adapted interview questions

(A) A set of questions was adapted to measure the extent to which digital technologies, especially artificial intelligence technology can be applied in Egyptian airports. (Do you feel that Egypt is able to transform ordinary airports into smart airports? Do you feel that Egypt has sufficient awareness to apply artificial intelligence in the administrative capital airport? What do you think are the defects that prevent the use of artificial intelligence in the capital airport?)

(B) A set of questions was adapted to measure whether the result of using artificial intelligence at the Capital Airport was negative or beneficial. (Do you think AI will have a harmful or beneficial effect on the airport? Why is this happening? Do you believe that the use of Artificial Intelligence has the potential to increase airport efficiency? And why is this so?)

(c) A set of questions was adapted to measure the amount of potential penalties for applying artificial intelligence at the Capital Airport (What are the problems that artificial intelligence will face in Egypt's airports, especially the Capital Airport? What are the potential risks of applying this type of technology at the Capital Airport?).

4. RESULTS

4.1 The Administrative Capital Airport's strengths that enable the use of Artificial Intelligence technology.

All participants indicated that the infrastructure is the basic element of the Capital Airport for the

application of artificial intelligence, so the Capital Airport has an infrastructure ready to apply all types of technology, and this is due to the reason for its construction to be Egypt's first as a smart airport

(Participant #2,3,4,5,12)

“Because it was designed and built according to the highest international standards, The capital's airport was built to become the first "smart" airport, characterized by an infrastructure capable of carrying the application of modern technology such as artificial intelligence”

(Participant #1,6,7,8,9,10,11)

“As a new airport is built with facilities that have the ability to apply the usage of artificial intelligence, It has a good infrastructure and facilities that enable to use the of artificial intelligence in it”

4.2 The flaws that prevent the use of Artificial Intelligence at the capital's airport.

Some participants indicated that stated that the most important factor impeding the application of artificial intelligence technology in Egypt is a lack of awareness among administrators about this technology and how to use and manage it in order to benefit from it to the greatest extent possible. The administrative capital is the first Egyptian experience with smart cities, so awareness and experience in using it must be increased before applying it in Egyptian airports.

Another group of participants expressed concern about using artificial intelligence because it will pose a significant risk to Egyptian workers with little experience who do not know how to deal with various forms of technology, not just artificial intelligence, and their fear of being dispensed with in exchange for using this technology.

Finally, some have pointed out that the costs of implementing such technology are prohibitively expensive. It is not easy to develop a machine that can replicate human intelligence.

(Participant #1,5,7,4,9,12)

"I think they're people that aren't used to the idea of this type of technology yet, as Lack of awareness and sufficient experience among airport management specialists"

(Participant #2,10,11)

"It will reduce the human labor in the airport. If people are not aware of artificial intelligence they may miss using its lack of experience"

(Participant #3,4,6,12)

"High Costs. The ability to create a machine that can simulate human intelligence is no small feat."

4.3 Artificial Intelligence will have a harmful or beneficial effect on the airport

All participants expressed the importance and benefits of applying artificial intelligence in airports, especially the capital's airport, and they said that artificial intelligence allows us to do things today that we could not do even five years ago, "such as checkpoints, artificial intelligence can tighten security measures in the ground area of airports and use learning techniques Automated to automatically analyze data for threats, including explosives and firearms

(Participant #1,5,7,12)

"It will make it much easier for travelers in several services. Like baggage management at airports, wrong handling of baggage will make it a rare matter despite the ever-increasing number of passengers annually."

(Participant #2,5,6,8)

"Of course, artificial intelligence will have a revolutionary effect in a good way on the airport because technology makes the process of operating any facility easier so we need it in sensitive facilities like airports."

(Participant #1,9,11,3,12)

"Minimize the time to end the procedures for the travelers."

(Participant #4,10,11,12)

"It will facilitate the traveling process and help make a great experience for the traveller, will help to facilitate travel procedures."

4.4 Egypt's readiness to deploy this type of technology in its international airports

58% of the participants expressed Egypt's ability to apply artificial intelligence at this particular time, and the reason is attributed to Egypt's tendency to develop a strategy to establish the idea of smart cities and airports. Egypt has launched the National Artificial Intelligence (AI) Strategy to exploit such technology to attain the country's sustainable development goals, play a key role in facilitating regional cooperation within the African and Arab regions, and establish Egypt as an active international player in AI. This is within the framework of Egypt's keenness to embrace the digital era, as advancements in technology continue to evolve every day. And 43% of the participants expressed their inability to apply artificial intelligence in Egyptian airports. Because they think that not everyone is aware of artificial intelligence, and that it is better to train people about it first, and then it will be easy to apply it anywhere in Egypt.

(Participant #1,3,5,7)

"Of course, Egypt is ready for that kind of technology, because we have no choice except for using technology in our lives like all the modern countries."

(Participant #2,4,6,9,12)

"Not everyone is aware about artificial intelligence, I think it's better to give training to the people about it first, and later it will be easy to apply it anywhere in Egypt"

(Participant #10,11,8)

"We need to gain experience first, It needs a lot of implementation and training and we don't have the awareness and enough experience in how we use it"

4.5 The potential risks of implementing this type of technology at the capital's airport

Most participants believed that the increasing importance of AI and the objectives for which it would be employed makes it even more critical to comprehend its possible shortcomings, and hence anxiety prevails on a variety of fronts. Because Egypt is still in the early stages of implementation, there will be numerous challenges and hazards to overcome, such as financial difficulties.

Some participants stated that there are no penalties for using artificial intelligence techniques because the benefits outweigh the drawbacks, and they emphasized Egypt's need for this type of technology.

(Participant #2,5,7,9,8,11)

"It may pose a threat in predicting flight times and causing chaos in the airport schedule."

(Participant #1,3,6,8,11)

"Financial risks, If it doesn't work losing the cost of it one of the risks"

(Participant #4,10,12)

“there are no risks to applying artificial intelligence in airports, actually nowadays it is a must with all the new technologies we see coming up each new day”

4.6 The use of Artificial Intelligence has the potential to increase airport efficiency

All participants agreed that the application of artificial intelligence will lead to an increase in airport efficiency; so many international airports are now relying heavily on artificial intelligence, as it can detect undiscovered risks, identify current problems, enable foresight of terrorist attacks, and facilitate the flow of passengers, as well as improving public security at airports in general.

(Participant #1,2,5,6,10,11,12)

“Yes, as airports are now heavily reliant on AI will raise efficiency as it can detect undiscovered risks, identify existing problems, enable the foresight of terrorist attacks, ease passenger flow, and generally enhance overall security at airports.

(Participant #3,4,5,7,11)

“It will help to raise efficiency by managing passenger flow and speeding up flights, monitoring the movement of passengers through checkpoints, overcoming translation difficulties, shorter waiting times for passengers, keeping track of what happens after the plane lands, and reducing equipment failures.”

(Participant #3,4,5,6,7,8,9,10,11,12)

“It will take care of providing the needs of all travelers, facilitating their travel procedures, and reducing crowding inside the airport and the occurrence of errors”.

5. DISCUSSION AND CONCLUSION

In this study, we see the impact of artificial intelligence on improving the passenger experience and international airports in Egypt, particularly the new capital airport. Among the most important are AI-powered air operations, AI-powered information systems, facial recognition, security robots, automatic inspection systems, baggage examination, and autonomous tractors (Dewi, 2020). We also conducted comparative online interviews with 12 experts in airline agencies. Implementing these applications in these airports has improved customer experiences (Narongou & Sun, 2021).

Moreover, artificial intelligence-powered automation and self-service solutions, improved employee workflow and increased air safety through predictive and educational aircraft maintenance (Pencarelli, 2020). Also, making informed pricing and market positioning decisions by leveraging data and pricing is dynamic (Mitchell, 2019). This study contributes to perceptions of using AI applications in travel operations at CCE Airport, revealing two factors: advantages of AI (enthusiastic) and disadvantages of

AI (suspicious). The benefits of AI are the direct results of implementing AI, such as solving complex management problems, saving time and money, performing tasks flawlessly, increasing business revenues, and increasing market share. This enables us to increase our investment in the aviation industry (Vinod, 2021).

It will also save time and focus on workflow improvements. As a result, service is available 24 hours a day, seven days a week (Khadonova et al., 2020). AI will analyze data in greater depth and reduce human errors through informed decision-making. While the second factor represents the disadvantages of using AI, such as computer hacking, decreased employee skills, less security for the customer's profile, and job loss (Fuad et al., 2021). Also, from a managerial standpoint, AI can help travel companies in Egypt improve their performance, increase customer satisfaction and perceptions, improve the tourist experience, and gain a competitive advantage. More systems are expected to be developed in the future and AI will be widely used in the travel industry in Egypt (Liming, 2022).

5.1 Theoretical Contribution

The study has a manifold contribution. This research was Egypt's first study on the application of artificial intelligence in the context of Egyptian airports. This study contributes to Cain et al. (2019) and Mohamed et al. (2018) literature by adding new AI applications never mentioned before recently implemented in some airports and new emerging markets especially Egyptian airports such as Capital International Airport. Through this study, it was found that some applications of artificial intelligence were applied in the top five airports in the world. However, not all applications of artificial intelligence were applied in one airport, as some airports had a deficit in some applications. In this vein, we contribute to the current literature by shedding light on the application of the AI application on the CCE airport/ emerging airports. Thus, in addition to the theoretical contribution to airport managers, the study has a critical implication.

5.2 Managerial Implications

The study provides insight into managerial implications for Capital International Airport. First, despite the Egyptian government's efforts to implement AI techniques. It is still in its early stages and thus tourism service providers in Egypt are not prepared to use AI techniques. The results found a lack of a clear vision and a lack of enthusiasm among leaders. Second a lack of appropriate technological infrastructure and qualified human cadres. We recommend necessary to increase tourism service providers and Egypt's official tourism agencies rely on AI techniques in analyzing the massive amount of

data and statistics they must make accurate and objective tourism decisions.

Third, we recommend creating vocational tourism training programs for new emerging market employees that focus on developing employees' skills and technological capabilities. The Results are that they can adapt to and deal with AI techniques efficiently and effectively. Also according to the results, we recommend creating tourism education curricula that are in line with the current technological revolution and connecting them to all new technological applications such as AI. Tourism service providers in emerging markets especially Egypt must be aware of all technological advances in the field of tourism information technology. Leaders and managers in official tourism agencies and airports should have a clear vision of the importance of applying AI techniques.

6. LIMITATIONS AND FUTURE STUDIES

The current analysis has numerous limitations. First, the study concentrates on the top five airports in the globe, hence we advocate increasing the top ten airports. The number of AI applications investigated in the study is also limited. As a result, we recommend that further new applications be added for future research. Despite these restrictions, the report proposes the adoption of AI technology at Capital International Airport. More emerging markets, such as Cairo International Airport and Sharm El Sheikh International Airport, should consider incorporating artificial intelligence solutions.

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