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Rise of Smart Airports: Implications on the African Aviation Industry

MBA

ABSTRACT

Background: The use of innovative technology in the travelling industry has enhanced connectivity among routine commuters in the industry. However, some airports have not been converted to smart airports, which delays the process from passport checks to security checks to boarding. Africa is a continent with no Smart Airports, considering the regular growth forecast by IATA, regional liberalisation contributed by the signing of the Single African Air Transport Market (SAATM), and the verse benefits Smart Airports bring to an economy.

Aim: This paper will propose that the development and use of smart airports will help the aviation industry to automate processes that will effectively enable passenger experience and other important flight management processes. And looks at its impact on the African aviation industry.

Methods: The current research will be using interpretivism research philosophy with the use of a qualitative research approach for collecting the primary data using semi-structured interviews with 20 participants who have travelled through O R Tambo (Southern), Jomo Kenyatta (Eastern), Murtala Muhammed (Western) International Airports including Dubai International and Heathrow Airport.

Results: The acquired results from the research will shed light on the benefits driven by the use of smart airports. It was stated that smart airports are the key to the future success of the African Aviation Industry

Conclusion: It is concluded that the African Aviation Industry can greatly benefit from the use of smart airports, which will also benefit the sustainable development of its economies.

Keywords: African Aviation Industry, smart airport system, thematic analysis.

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CHAPTER ONE

1.0 Introduction

Smart airports are significant in a fast-growing and highly demanding world, according to the International Air Transport Association (IATA). Fattah et al. (2009) assert that airports are gateways to a nation which helps create a first impression on tourists boarding in. For this purpose, every airport must be modern because it offers every necessity and luxury that a traveller might look for. One of the most in-demand airports in the world is a smart airport. Smart airports provide a hassle-free experience to passengers along with providing them with various luxuries, such as Singapore's Changi Airport, which offers a rooftop swimming pool and a 24-hour cinema (Alansari, Soomro and Belgaum, 2019). Furthermore, smart airports also provide a variety of different features and facilities, such as the advanced self-service security screening system, Artificial Intelligent robots at passenger terminals, smart pass check-in and boarding, and drop-off courier services for home baggage (Source???). Similarly, many developed markets in countries outside of Africa have liberalised their airport systems. However, according to (IATA, 2014), the African aviation market are still subject to restrictive consensual agreements, which are responsible for limiting the growth of air services in Africa.Africa?? Still lack the implementation of smart facilities in an airport, unlike the Dubai International Airport, which uses smart facilities like smart gates, allowing the passengers to use the automated machines rather than waiting for an immigration officer (Pineda *et al.*, 2018).

Their area majority of the airports are still not up-to-date with appropriate services for travellers. In terms of the African Aviation Industry (AAI), smart technologies can help airport

managements and travellers handle passengers, luggage, and plane controls effectively. With innovative aviation technology rising, the current infrastructure of airports and their logistics systems requires improving the management of airports (Elliott and Radford, 2015). Shehieb et al. (2016) believe that travellers make their first impression of the country they visit from the necessities they provide at the airport. Countries that are economically strong would look to provide smart airports to the travellers that are departing or arriving in the country. Smart airports use emerging technologies with advanced and pervasively deployed sense-analysed response capabilities (Bouyakoub et al., 2017).

Furthermore, Aviation in Africa is considered to have the necessary potential to improve the economic conditions of Africa (IATA, 2014). Similarly, Air transport is known for connecting markets and simplifying trade (Mehmood, Shahid and Ilyas, 2015). Therefore, adopting smart airports in the Aviation industry enables African firms to link the global supply chain network. Mehmood et al. (2015)indicated that the Aviation industry plays a crucial role in the global manufacturing and trading the freshly produced agricultural material from developing economies to developed markets. Furthermore, Wensveen (2016) reported that improving air connectivity could enhance productivity, improve business operations, and encourage innovation.

Similarly, Tretheway and Kincaid (2016)stated that convenient air facilities ensure the arrival of tourists to a country or a region. Furthermore, African airports also require the adoption of smart airports in order to facilitate tourism (Barros, 2014). Therefore, the Africa Accra conference also highlighted the challenges faced by African airports regarding the limited capacity, optimisation of resources, and sustainable development (Africanaerospace, 2019).

1.3 Problem Statement

Africa needs smart airports to improve the experience of travellers. By not having smart airports in place, travellers must go through rigorous checking, which could have been avoided if the government had invested in creating a smart airport. Furthermore, the study must highlight the problem of lack of liberalisation in African airports. Therefore, lack of liberalisation leads to decreased air service levels and increased fares, which as a result, restricts tourism, investments, and trade. Lack of liberalisation due to the restrictions in African airports can also lead to ineffective implementation of smart airports. This study argues that addressing such issues will enable the African aviation market to increase its number of passengers and tourists, attract the market for business aviation, and adopt the concept of smart airports to facilitate efficient tourism.

The implication of smart airports on the aviation industry in Africa has not received much attention in the extant literature. The problem that is addressed in the study is to analyse the implications that smart airports in Africa would face and the impact it would have on the economy of business after the signing of the current Single African Air Transport Market (SAATM) by 23 African countries (*Benin, Botswana, Burkina Faso, Cape Verde, Congo, Cote d'lvoire, Egypt, Ethiopia, Gabon, Ghana, Guinea, Kenya, Liberia, Mali, Mozambique, Niger, Nigeria, Rwanda, Sierra Leone, South Africa, Swaziland, Togo, and Zimbabwe*) to enhance the regional integration. Furthermore, the research problem for this study also includes the influence of different factors that are responsible for damaging the growth and sustainability of airports in Africa. Similarly, the study of Martini and Scotti (2017)also discusses that the infrastructure of African airports is obsolete and is not able to facilitate the increased number of passengers.

Njoya (2016) also mentions the research problem that the Airlines and airports in Africa are managed by the government and local authorities. Therefore, foreign investment in dejected. Similarly, there is also a lack of liberalisation, which affects air connectivity and ticketing costs. Furthermore, the study also highlights the research problem of travelling inefficiency for travellers in reaching their final destination.

Yet, with the implication of smart airports, the aviation industry has entered the global age that supports the use of online record-keeping for increased passenger growth in air traffic. Such practices of the global airports' industry have also impacted the African Aviation industry. These risk issues in the African aviation industry are in relation to volatility in the global health scenario. The African countries and their aviation industry have to develop strategies for reducing the risks.

Other factors affecting the global practices of the African Aviation Industry can be explained as the increased level of competition among the service providers. It was further described that compliance with the international rules and regulations of the Aviation industry had not been followed in the African Aviation Industry. All the mentioned issues are negatively impacting the African Aviation Industry.

1.4 Importance of addressing the Problem

1.6. Rationale

The rationale of the study was to understand the implications???, of smart airports in Africa. Therefore, the study of Njoya (2016) highlights that certain threats threaten the aviation industry in Africa. However, according to the study of (Fattah et al., 2009), the adoption of smart airports in North America, Europe, and Asia has evolved the explosive growth and development

of the airline industry at a global scale. Similarly, smart airports have also provided traffic growth, choice, and diversity for airline passengers in North America, Europe, as well as Asia. Therefore, the study focuses on the different perspectives regarding the economic impacts and the adoption of smart airports in the African aviation industry. However, the study also identifies the literature gap present in the study; the literature gap of the study includes the limitation of data regarding the adoption of smart airports in the African aviation market. According to Alansari, Soomro and Belgaum (2019), the action plans for airports have improved significantly in the past years. Therefore, this study identifies the areas for improvement in different sectors of Africa's aviation industry and the implementation of smart airports to provide smart services to travellers and tourists.

1.5 Aim

The study aimed to investigate and analyse the implications? of a smart airport in Africa on aviation-related businesses after the signing of the Single African Air Transport Market(SAATM).

1.7 Research Objectives

- To identify the factors leading towards the implication of smart airports in the African Aviation industry.
- To analyse the problems experienced by the African aviation industry in managing smart aviation operations.
- To analyse the effectiveness of Kotoka International Airport and Cape Town International Airport compared to Dubai International and Heathrow International airport.

1.8 Research Questions

- What is the importance of smart airports in the Air Transport Industry?
- What are the opportunities and threats of a smart airport in Africa, with a specific focus on Nigeria, South Africa and Kenya?
- Comparison of O R Tambo Southern, Jomo Kenyatta Eastern, Murtala Mohammed Western African International Airports with Dubai International and Heathrow Airport's future smart plan and its impact on customer experience and economies.

1.9 Significance of Study

The research area of this study is important for future researchers because it will enable them to obtain important study material regarding the adoption of smart airports. Furthermore, the study will provide relevant recommendations for comparing African airports and airports in developed countries. Therefore, such recommendations will allow the researchers to explore the concept of smart airports in Africa. In addition, the study is also essential because it covers various possibilities regarding the importance of smart airports in the aviation industry. Furthermore, the study will also provide necessary information regarding the opportunities and threats faced by the adoption of smart airports in Africa, thus allowing researchers to gain necessary literature which will be further used to analyse the concept of smart airports in Africa.

General comment for this section.

You've made some good efforts here, but the section appears too narrative instead of a review. For instance, Section 2.2 only narrated the content of the International Air Transport Association (IATA) report for 2017; Section 2.3 describes Dubai International and Heathrow Airport, etc. I expect you to compare, contrast, deduce and identify gaps in available studies. The identified gaps must be filled with the achieved objectives. I can't find the theoretical lens you are following. Again, I encourage you to use peer-reviewed articles in journals on the ABS list as much as possible in this section.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The importance of carrying out a literature review for the study was to understand the importance of smart airports in Africa and the economic impact it brings on the African Aviation Industry. Currently, there are no airports in Africa that are turned into smart airports, so opportunities and threats have to be analysed to see how creating smart airports in Africa would help improve regional integration, focusing on the economic impacts of business as well. Additionally, the current chapter provides a brief discussion and argumentation on Smart Airports' emphasis in Africa. Furthermore, the current chapter highlights the growth forecast of IATA by the year 2036, which impacts SAATM. By identifying the problems of a conventional airport, the discussion on opportunities for having a Smart Airport is presented.

Additionally, the thorough argumentation on threats experienced by African nations in building Smart Airport is discussed. Moreover, the major economic factors affected by Smart

Airports' establishment are highlighted. Lastly, the chapter presents a critical understanding of the impact of Smart Airport on the African Aviation Industry.

2.2 IATA's growth forecast by 2036 and SAATM

The International Air Transport Association (IATA) has discussed in its 2017 report that the number of passengers will grow significantly by 2036 (IATA, 2017). This means that there is a high probability that the 4 billion air travellers will be increased by 2036 (IATA, 2017). This particular prediction is based on the 3.6% average Compound Annual Growth Rate (CAGR), which focuses on the 20-year Air Passenger Forecast. The IATA report further states that the main driver for the increase in passengers is the Asia-Pacific region. The main markets would be China, the US, India, and Indonesia, followed by the UK, Japan, Spain, Germany, Turkey, Thailand, France and Italy, as shown in Figure 1, attached on the next page (IATA, 2017).

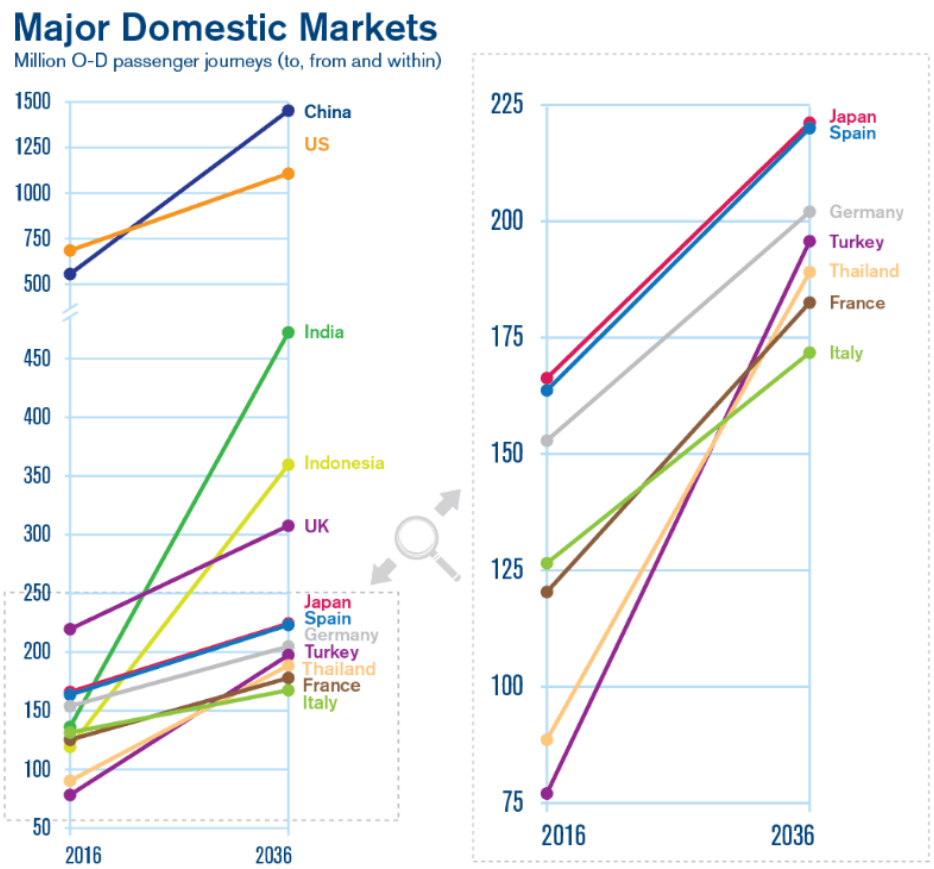

Figure 1 - Forecast of countries with an increase in passengers

(Source - IATA, 2017).

The growth forecast for Africa is mixed in 2019 and 2020; Africa, the Middle East and Latin America are expected to lose money (IATA, 2019). Furthermore, African carriers will continue to suffer because of the structural problems related to high costs, government taxes, and low load factors (IATA, 2019). However, the IATA report also suggests that the economic growth in the African region is expected to rise in 2020. In addition, the markets in the African region are extremely damaged and are served incompetently in the absence of the SAATM.

2.3. Dubai International and Heathrow Airport

Dubai international and Heathrow airports are recognised airports that use smart technologies to provide optimal customer service (Kalakou, Psaraki-Kalouptsidi and Moura, 2015). Dubai international, the busiest airport in the world, has developedsmart tunnels that have eased the customer recognition process (Tynan et al., 2017). With the technology in action, passengers only have to walk through the tunnel, passengers' faces are recognised biometrically, and the entire passport examination procedure has been reduced to 15 seconds (Mohamed, Gomaa and El-Sherif, 2018). Dubai international has further digitalised its Airport Operations Control Centre (AOCC), which currently uses smart state-of-the-art software to monitor its operations in real time. The AOCC operates 24/7 and has significantly assisted the airport's management in reducing costs and increasing efficiency (Khan et al., 2017).

Furthermore, Dubai international has taken significant initiatives to handle its crowd and ease its process. They have introduced smart gates for their customer that significantly eases security procedures (Al Hasani, 2019). With smart gates in use, Dubai nationals are able to conveniently pass passport procedures within seconds which eventually has increased the efficiency of the management process at the airport (Mohamed, Gomaa and El-Sherif, 2018).

Heathrow airport, located in London, is the UK's biggest airport. Like Dubai international, Heathrow airport uses smart technologies to enhance its processes. The degree of smart technology is not as impressive as Dubai international. However, Heathrow airport has had its share of innovative technology (Mohamed, Gomaa and El-Sherif, 2018). Heathrow airport has introduced an innovative positive boarding project which has enhanced the passenger boarding process with state-of-the-art data management software. The software from their boarding passes records the passengers' information. Afterwards, based on the recorded information from the

boarding pass, the passengers are informed about their flights and are kept up-to-date (Ghanze et al., 2017). Furthermore, Heathrow airport has created a smart environment to cater to the special need of individuals with disabilities. The airport uses sensory walls to soothe such individuals with its aquatic bauble tube, colour-changing LEDs and other features (Kelley, Prohn and Westling 2016).

Dubai international aims to digitalise its entire processes, and its management plans to run the entire business with artificial intelligence (AI). It is looking forward to replacing immigration officers with artificial intelligence. The AI-controlled process will render traditional security procedures insignificant with its advanced technology (Mohasses, 2019). Furthermore, it is looking forward to introducing robots to use specialised robots that will make the process of baggage handling efficient. Self-driving automated cars are planned to be introduced at Dubai international, and the cars will run on solar or electrical energy and thus will be eco-friendly (Nowacki and Paszukow, 2018). Like Dubai international, Heathrow airport is planning to enhance its procedure further. The airport management plans to introduce biometric testing that conducts facial recognition on passengers to make the process of passport examining more efficient (Mohamed, Gomaa and El-Sherif, 2018).

2.3 Importance of Smart Airports in the Air Transport Industry

Smart Airports are the type of modern airports that is aimed to provide airport operations and passengers with an experience that they have not witnessed before. Fattah et al. (2009) assert that smart airports would use Web 2.0 and 3.0 technologies, sensors, processors, and communications to provide the entire system with a new, foundational framework, allowing the idea of real-time sense-analyse-respond capabilities.

Alansari, Soomro and Belgaum (2019)state that the use of check-in, security check or boarding would not be considered the main areas to know if a passenger is present at the airport. Implementing the smart airports' aspect creates a pervasive and persistent connection with the passenger, allowing continuous, real-time communications without disruption. Shehieb et al. (2016) assert that these capabilities would allow every stakeholder, such as the airlines, security, operations, concessionaires and other service providers, to deal with passengers and provide them with the required information when and where the latter requires it. With time, the capabilities tend to evolve, allowing the stakeholders to make their interaction further personalised, media-rich and highly valued (Bouyakoub et al. 2017).

Fattah et al. (2009) have stated that airports can also work towards moving past their physical boundaries to improve the experience for passengers at different points of their travel. An example that can be noted here is that airports offer information on the status of roads and parking to the customers, built on predefined parameters. This would help passengers get an idea as to what their departure time should be, as well as get an idea of the choice regarding the parking and other services that the smart airports in Africa may offer.

Additionally, the study by Luke and Walters (2013) discussed that Smart Airports would not just be a factor of convenience for customers, but rather it would allow them to explore a wide range of services. The author added that the trend of Smart Airports has been emerging in developed nations of the world. Developed nations such as USA, UK, Germany, France and many more have been researching irregularities faced by airport administration and customers in using the service of the conventional airport (Luke and Walters, 2013). These nations believe that the Smart Airport would make air travel service a luxurious service for multiple classes of consumers and would make it easier for customers to travel internationally. However, the study

by Alansari, Soomro and Belgaum (2019)critiqued that the Smart Airport would introduce newer policies of travel that would hinder the accessibility of customers for travelling internationally. A similar author added that Smart Airport would be using modern technology to detect minor deformities of equipment and machines to manage airport air traffic and internal processes (Alansari, Soomro and Belgaum, 2019). In addition, the author claims that establishing Smart Airports would eradicate flight delays and waiting time for consumers when arriving at those airports (Alansari, Soomro and Belgaum, 2019). The process of custom check and immigration would be automated with modern technology that would save considerable time for travellers via using Smart Airport (Elliott and Radford, 2015).

2.3.1 Benefits of Smart Airports

According to Hong, Oh and Lee (2019) study, smart airport solutions are adopted by airports around the world to improve technology at the airports. Therefore, smart airports use smart gates, facial recognition and navigation of airport areas through mobile devices, effective air traffic management, and baggage management. Furthermore, smart airports in Africa can provide travellers with efficient communication, improved freight operations systems, and quick ticketing and information systems. According to the study of Mohamed et al. (2018), smart airports can also present different avenues to ensure the satisfaction of passengers and travellers. Therefore, the study of Đinh (2018) discusses that airports are data-rich places, and with the improvements in the technology the existing data can be utilised effectively. In addition, the implementation of smart airports will also benefit travellers and ensure they receive a positive flying experience. Furthermore, the study of Analytics (2018) suggests that smart airports will

provide airlines, stakeholders, and passengers with a satisfying experience and will change the infrastructure of the aviation industry.

2.4 Problems of not having Smart Airports

Numerous airports around the world have still not been turned into smart airports. There are numerous hassles to deal with for passengers, and with many airports not being smart airports, it simply means that hassles increase ten times more (Luke and Walters, 2013). There is the issue of dealing with security, searching for the gate to board, waiting in queue for boarding, and so on. Countries that do not have smart airports have to deal with such issues and much more. Alansari, Soomro and Belgaum (2019) regarded that the problems at airport across the world varies from country to country as a developed nation like the USA, Canada, and China can spend more on strengthening the functions of an airport; Whereas underdeveloped and developing nations such as Asian and African countries are considered to have more functioning problems than developed nations.

2.4.1 Check-In, Passport Control & Boarding

Shehieb et al. (2016) state that for every airport in the world, the priority is to ensure that the identity of travellers is checked. This particular check is carried out numerous times until the passenger has reached his seat on the plane. Airports that are still not turned in to smart airports have to go through the hassle of manually checking each traveller. This is usually done by checking the passenger's passport photo and verifying their details in face-to-face interaction. Bouyakoubetal. (2017) believes that such a kind of checking tends to delay the entire process of check-in, passport control, and boarding. In addition, the study of Sedláčková and Švecová

(2018) identified that the process of departure and arrival consumes considerable time for consumers during international travel. These processes involve check-in, check-out, boarding and verification of passport. The author added that these processes had been a major problem experienced by consumers while using the service of the conventional airport(Sedláčková and Švecová, 2018). The study of Martínez and Marín (2015) supported the argument by highlighting that these time-consuming processes are some of the factors that make the travelling experience exhausting for consumers. However, the study of Bouyakoub et al. (2017) highlighted that the cases of identity theft and fake IDs promote the development of Smart Airport as with the modernisation of technology, the development in cyber-crime would take place that could compromise the overall experience of consumers of air travel.

2.4.2 Security & Navigation

One of the hurdles that passengers experience while going through, as per Fattah et al. (2009), is security and navigation. The aspect of moving from check-in towards the boarding gate is a process that almost all passengers would love to avoid. Airports that have not been turned into smart airports tend to make passengers take their shoes off, remove their laptops from their carry-ons, and be required to move through secondary searches, which in some extreme cases, require passengers to take their clothes off. It would not be wrong to state here that this entire process only means that the travellers are bound to get frustrated in long queues. Elliott and Radford (2015)state that one of the major reasons that travellers hate airports is the long queues they have to go through on a long trips.

Additionally, the study of Doose et al. (2010) highlighted that security and navigation had been a serious concern in the aviation industry as these are the factors that create barriers to

consumer travelling. Moreover, the study by Cave et al. (2014) considered that the department of security and navigation requires high monitoring skills in order to prevent trespassing. Similarly, Guerreiro et al. (2019) study identified that security and navigation are two major areas where airport provides key resources to prevent any uncertainty. The study by Li et al. (2014) stated that technology airport navigation system is being practised at multiple airports worldwide. However, consumers still find this technology inconvenient due to a lack of precision (Li et al. 2014). In contrast, the study of Graham (2018); Assaf (2010) asserts that nations are required to establish Smart Airports in order to strengthen the function of security and navigation at airports to prevent accidents and other uncertainties at airports.

2.4.3 Luggage tracking

On a regular basis, numerous travellers lose their luggage due to one or the other reason that is usually the fault of airports. Many travellers have had to face the bad fortune of experiencing their luggage being left at the departure airport, and no one has any idea of how the entire situation took place (Shehieb et al., 2016). This is a major problem that has taken place with airports that are not smart. It is the airport's responsibility to consider this issue and focus on resolving this matter to provide the customer with a better experience (Bouyakoubetal., 2017). According to the study of Senno et al. (2013), one of the major problems faced by air travel customers is losing luggage. The author elaborated that the luggage tracking system varies at multiple airports worldwide; however, the cases of losing luggage do not decline.

Similarly, the study of Medeiros, Costa and Fernandes (2011) considered losing luggage to be the worst nightmare for air travellers. The consumer never uses the services of airlines with weak luggage tracking systems (Gupta et al. 2017). With the lack of Smart Airports, luggage

tracking has been a major concern for conventional airports as the airports do not have enough resources to establish advance technology for tracking travellers' luggage (AlMashari et al. 2018). In addition, the study by Graham (2018) indicated that the implication of modern technology at the airport would make luggage tracking much safer and minimise luggage loss cases. Although, Bouyakoub et al. (2017) argued that using technology would create several cyber threats, such as hacking at the airport, due to which the security threat would rise in Smart Airports.

2.5 Economic Factors affected by Smart Airport

According to Del Olmo Sánchez's (2017) study, Smart Airport provides a comfortable and convenient experience to international travellers. Additionally, the study of Fattah et al. (2009) highlighted that Smart Airport encourages travellers to use their service rather than conventional airport as Smart Airport offers faster service with minimum waiting time for multiple processes such as checking-in, checking-out, boarding and passport controlling. Furthermore, Smart Airport uses the latest technology in navigating air traffic to minimise the risk of accidents(Bouyakoub et al., 2017). Moreover, it ensures strong security using modern technology that detects intrusion and perimeter breaches better than conventional airports (Bouyakoub et al., 2017).

The study by Kumar and Dahiya (2017) referred that Smart Airport contributes to improving an economy by generating a wide range of foreign currency from travellers. Furthermore, the study by AlMashari et al. (2018)highlighted that a smart airport facilitates the import and export of a state as it functions faster than a conventional airport and ensures more security as well that increases the capacity of a nation for import and export. With the

availability of smart airports, tourists feel safe visiting a nation as it ensures the security of their valuables. Additionally, the study of Sedláčková and Švecová (2018) indicated that smart airports are capable of making travelling plan for consumers that contribute to making their journey sustainable (Martínez and Marín, 2015). Although, the study of Alansari, Soomro and Belgaum (2019) idealised substantial tax generation from Smart Airport services. The similar author added that with Smart Airports being the latest trend, people from around the world would like to experience the modern services of Smart Airport; hence they travel through Smart Airport, which can result in the generation of a considerable amount of tax for the country (Alansari, Soomro and Belgaum, 2019).

With the emergence of Smart Airport in multiple developed nations across the world, the study by Luke and Walters (2013) regarded that it increases the capacity of investors for investing in businesses as they perceive the establishment of Smart Airport to be innovative and productive. Furthermore, the study by Mohamed, Gomaa and El-Sherif (2018) stated that Smart Airports play a significant role in providing better connectivity between countries to improve the global economy. In addition, Smart Airport affects the economic development of a nation as economic development is determined by the level of infrastructure being built and utilised in a nation (Shehieb et al. 2016). Thus, as Smart Airport utilises modern technology and represents modern infrastructure, it contributes to increasing the economic development of a nation Luke and Walters (2013).

2.6 Opportunities for having Smart Airports in African Nations

According to the study of Alansari, Soomro and Belgaum (2019), African nations accounted for minimum economic growth that affects the per capita income of African citizens.

Similarly, the study of Bouyakoub et al. (2017) highlighted that African nations have been facing issues like poverty, illiteracy and unemployment for centuries. Thus, the studies of Alansari, Soomro and Belgaum (2019) considered African nations to be inappropriate for building Smart Airports. However, the study by Jones and Williams (2012) indicated that more than half of Africa's countries use solar power to generate electricity and fulfil energy needs. A Smart Airport powered by solar energy would be highly innovative for multiple nations in Africa (Jones and Williams, 2012). On the other hand, it would attract numerous investors from foreign nations to work on such projects that lead towards Africa's economic development (Wennberg, 2019).

The study of Elliott and Radford (2015); Shehieb et al. (2016) focused on the capacity of African nations such as Nigeria and Kenya for technological development. The author supported their argument by highlighting the Virtual University of Nairobi's example, which utilises highly innovative equipment to teach native citizens. Similar authors argued that the trend of academic inflation taking place in these nations created a huge demand for specialised degrees and diplomas, improving the quality of education offered in Kenya and Nigeria (Elliott and Radford, 2015; Shehieb et al., 2016). Thus, the authors concluded that with learning opportunities like this, people from surrounding nations would prefer getting an education from African nations that improves a nation's economy (Elliott and Radford, 2015; Shehieb et al., 2016).

The study of Mwaniki (2017) supported the argument by highlighting that economic development in African nations raises the opportunity for establishing Smart Airports, as the conventional aviation system in African countries is not up to the mark; Thus, requires innovative systems such as Smart Airport to attract foreigners for availing benefits of travelling in Africa (Mwaniki, 2017).

2.7 Threats faced by African Nations in building Smart Airport

According to Geldenhuys's (2019) study, African nations such as Nigeria, Tanzania, Kenya and more have abundant natural resources that foreign nations like the USA use to make luxurious finished products. SinceAfrican nations have a major problem of unemployment, poverty and illiteracy; thus the local residents do not give value to things like Smart Airport as it does not satisfy their needs. However, the study of Le Sage (2010) indicated that third-world nations like Ghana and South Africa experience high intervention from foreign nations, such as the USA, that restricts development like Smart Airport in these nations. Moreover, it has been stated that the low intervention of local governments in developing African nations undermines the idea of establishing Smart Airport in African Nations (Le Sage, 2010). Additionally, AlMashari et al. (2018) highlighted that projects in African nations are accounted for forced abandonment due to control of foreign stakeholders that restricted the government investment in large projects like Smart Airport.

2.8 Impact of Smart Airport on the African Aviation Industry

According to the study by Alansari, Soomro and Belgaum (2019), Smart Airport has been an emerging trend followed in multiple countries of the world. The Aviation Industry of Africa has been planning to enforce the implication of Smart Airports in Africa in order to bring economic development in African nations via tourism (Fattah et al., 2009). However, the study of Elliott and Radford (2015) argued that most African nations are deprived of basic resources that restrict economic growth within these nations. Thus, these nations could not afford to invest in expensive projects like Smart Airport. At the same time, the study of Alansari, Soomro and Belgaum (2019) considered Seychelles, Algeria, Mauritius and Tunisia to be among the most

developed nations of Africa that have the capacity to establish Smart Airports. In terms of the Aviation Industry of Africa, the study of Luke and Walters (2013) highlighted that the nations like Mauritius and Tunisia would contribute most to the economic development of Africa as these nations are preferred for tourism and generate considerable foreign exchanges; Thus, have a high capacity to build Smart Airport that further increases the tourism in Africa.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

In this chapter, the methodology of the study is laid out. The methodology chapter comprises setting the research philosophy, research approach and strategy used to carry out the study. The types of investigation, data collection method, data analysis method, sampling method, sample size, ethical issues and research limitations were also made part of the study.

3.2 Research Philosophy

The research philosophy that was chosen is interpretivism. Bell et al. (2018) state that interpretivism comprises researchers who focus on interpreting the study elements. The justification for using the interpretivism philosophy is that the study is focused on analysing and interpreting the opportunities and threats of a smart airport in Africa and the type of economic impact it will have on a business (Hennink, Hutter and Bailey, 2020). According to the study of Pham (2018), the interpretivism philosophy implements a realistic approach to acquire the study for the study. The secondary data collection method is considered more appropriate for the interpretivism philosophy. However, this study employs the use of primary and secondary data collection methods, which is essential for the interpretivism philosophy to explore the horizons of the research area. Furthermore, according to the study by Ryan (2018), the philosophy of interpretivism clarifies the meaning of the study at the end of the research. The study used the interpretivism philosophy because it is based on the social reality formed by human experiences and is not singular in nature.

3.3 Research Approach

The research approach that is used in the study is the qualitative approach. Within the qualitative approach, the inductive approach was used as it focused on the aims and objectives of the research, which is what this study is based on (Quinlan et al., 2019). Furthermore, the inductive research approach is also known as inductive reasoning, which applies to the philosophy of interpretivism (Liu, 2016). As per the study of Zalaghi and Khazaei (2016), the inductive research approach also includes observation patterns, hypotheses, and theory. In addition, the study applied the use of the inductive approach because it is considered a flexible approach. Furthermore, the inductive research approach also allows for utilising the information already perceived in order to analyse the research area in detail.

3.4 Research Strategy

The research strategy that was used in the study was grounded theory. The purpose of using this theory is that it allows the research to create a theory from the data that would be attained from participants (Walliman, 2017). Moreover, grounded theory is used to appropriately discover the problems in the research area and highlight the strategies to tackle such problems. Therefore, according to Saunders, Lewis and Thornhill (2012), the grounded theory conveys, tests, and reformulates the prepositions to develop a theory. Similarly, the study applied the use of grounded theory to contradict traditional research methods and scientific methods. Furthermore, the study also used grounded theory to identify the anchors to collect the essential parts of data. In addition, the grounded theory also allowed us to develop an understanding regarding the theories and paradigms which are unable to explain the phenomena.

3.5 Types of Investigation

The type of investigation chosen for the study was qualitative interviews. The purpose of having interviews is that allows face-to-face interaction with people, which helps get verified information (Bryman, 2016). The study was about smart airports, meaning there was a need to attain information about smart airports from the travellers who have used them. The interview method provided this information efficiently. Furthermore, the qualitative interviews provided the necessary information regarding smart airports.

Similarly, the qualitative approach also enabled to obtain of opinions and perspectives of different individuals from diverse backgrounds. According to the study of Silverman (2015), qualitative data is known as the non-numeric set of information such as interviews, audio, video, and transcripts. In addition, the study applied the qualitative type of investigation because it allowed us to gain necessary information regarding smart airports and their economic impact on the African aviation industry. Furthermore, the qualitative investigation method revolves around understanding multiple characteristics and approaches. Similarly, the study also used the qualitative investigation method because the study's outcome is in a non-numeric form.

3.6 Sampling and Data Collection Method

The sampling method applied in the study was the non-probability sampling method. This method used convenience sampling, which was mainly about the participants being selected on availability and willingness to become part of the study (Quinlan et al., 2019). The researcher asked the travellers if they wanted to be part of the study and included them accordingly.

The data collection methods chosen for the study were primary qualitative data and secondary data collection methods. The primary data collection was carried out through the use of qualitative research interviews. The secondary data collection will use past research papers and journals (Bell, Bryman, and Harley, 2018). In addition, secondary data collection methods also include newspapers, journals, magazines, articles, books, and websites (Kabir, 2016). Furthermore, the study applied the use of primary and secondary data collection methods because it performs a wide range of studies regarding smart airports and their economic impact on the African aviation industry. In addition, using both data collection methods such as primary and secondary, was essential for the study because it accurately determined the authenticity and validity of the research accurately. Moreover, the use of primary and secondary data enabled to gain of the primary perspectives of the participants of the interviews.

3.9 Sample Size

The sample size chosen for the study was 20 participants who have travelled through O R Tambo Southern, Jomo Kenyatta Eastern, and Murtala Muhammed Western African International Airports, including Dubai International and Heathrow Airport.

3.8 Data Analysis

The use qualitative approach is carried out in the study, with the data analysis method applied is thematic analysis. The use of thematic analysis is carried out as it would help present the travellers' experiences realistically(Hennink, Hutter, and Bailey, 2020). The benefit of using thematic analysis is that it is flexible, and the results attained from this theory are easy to understand. According to the study of Taylor, Bogdan and DeVault (2015), it is essential for research to include an accurate data analysis plan and the data analysis methods which are

appropriate for the research area. Furthermore, the study applied the use of thematic analysis because it allowed analysing of the primary and secondary data, which is essential for the research. Therefore, the researcher effectively applied the use of thematic analysis to generate accurate results regarding smart airports and their economic impact on the African aviation industry. Moreover, the researcher used thematic analysis because the data collection method used in the study is both primary and secondary.

3.10 Ethical Issues

All ethical aspects were considered while interviewing for the study. The consent forms were signed by the participants to prevent any kind of issues regarding the participants stating that their consent was not taken (Walliman, 2017). Furthermore, the study followed all the necessary ethical constructs, which are important in primary and secondary data collection methods. Similarly, the study also made sure to remain honest and transparent regarding the interviews with the participants. Furthermore, the study also effectively planned the interview questions in advance and ensured that the integrity and honour of the participant remained intact. Furthermore, this study also properly references the work of different authors cited in the study. This study also used authentic data collection methods and did not damage the reliability of the study.

3.11 Research Limitations

The research limitation that was part of the study is that since interviews were carried out, broad information would not be attained. The experiences provided by the travellers are the only information the study will rely on. Furthermore, the research limitation which was persistent throughout the study was that the data regarding the implementation of smart airports in Africa is very limited, and data was derived through the opinions and perspectives of travellers. Similarly, the limitation regarding the study, which limited the scope of the research, was that the qualitative investigation method was used, which was time-consuming and required extra effort. In addition, due to the data being based on the interviews, the researcher was also not allowed to interpret the findings and generate results on their interpretation.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter is developed for conducting the data analysis for the research based on determining the rise of smart airports with its implication on the African aviation industry. The current chapter develops the comparison analysis for developing and identifying the main research findings. The chapter will compare African international airports and Dubai International and Heathrow International Airport so that the smart airports' main operations can be explained effectively.

This comparison analysis is based on the secondary qualitative research approach for collecting and analysing the research reports and different research articles that will provide both qualitative and quantitative values about the airports' operations (Varatharajan *et al*. 2018). In the current chapter, findings are also discussed to generate a broad perspective on the developing situation in Africa's aviation industry with respect to the smart technologies implemented. In the end, the chapter ends with the conclusion.

4.2 Primary and Secondary analysis

4.2.1 Critically comparing the factors leading towards implication of smart airports at Cape Town International Airport and Kotoka International Airport

It has been discussed by Walcott and Fan (2017) that the airport industry of Africa has a rush of making development in its airport settings. The IATA has projected a growth of 5.1% in their passengers throughout the country by 2035 (Tyler, 2016). It is renowned by Acheampong (2017) states that Cape Town international airport is the third largest airport in Africa that

conducts both domestic and international flight operations from the country named South Africa. Kotoka International Airport is one of the main airport facilities that performs its functions of international and domestic flights from Ghana. Both airports perform their functions to support the growth of Africa's Aviation industry (Koseoglu and Arayici, 2019). With respect to making effective comparisons among the airport's functions, Kavunkil Haneef (2017) identified different factors that also support the growth of the airports.

Comparing factors	**Cape Town International Airport**	**Kotoka International Airport**
Demand factors	It was explained by Söderbaum, and Taylor, (2018) that, for the year 2018, there was a slight decline of 1.4% in the demand of domestic flights in comparison of the international flights that grew by 3.7% (Söderbaum, and Taylor, 2018).	Sarfo, (2018) has explained that the international and passengers demand from the airport increased by 45% in comparison of previous decade operations. This growth was supported by the passengers who are travelling for business and leisure purpose (Sarfo, 2018).
Service factors	The services that are provided by the Cape Town International Airport pleases the passengers in travelling for domestic and international flights are based on the delivering services to freight control, and luggage control (Söderbaum, and Taylor, 2018).	General aviation, air navigation, air freight services are provided by Kotoka International Airport. It was further explained by Sarfo, (2018) that these services help in the growth of the airport services od passenger control and luggage control that can lead towards the development of smart

	The services are offered to the passengers include security, customer care, and a comfort level that is much needed by the passengers (Söderbaum, and Taylor, 2018).	airports as these services please the passengers (Sarfo, 2018).
Facility factors	The facilities provided by the Cape Town International Airport are customs, baggage reclaim, and passport control. These facilities are delivered by the service professionals (Söderbaum, and Taylor, 2018).	The facilities that are provided by the Kotoka International Airport are in relation of baggage reclaims, customs, and other passport controlling practices which can support the organisational growth (Sarfo, 2018).
Managerial factors	The managerial factors that affect the business performance of the Cape Town International Airport are supportive of growth practices. These factors are managed by Airports Company South Africa (ACSA) (Söderbaum, and Taylor, 2018).	The managerial factors used in the Kotoko Airport are in relation of satisfying the organisational needs and passenger's needs. These needs are look after by Ghana Airports Company Limited (Sarfo, 2018).

From the above developed comparing factors about the Cape Town International Airport and Kotoka International Airport, it can be understood that both airports are functioning properly to cater for the travelling needs of their target market. Yet, these airports are not functioning

properly in terms of delivering successful operations to the passengers, and there is a requirement for conversion of the airport management practices into smart airport services. The development and implication of smart airports will increase the level of efficiency among the airports.

In terms of primary evidence, One of the respondents has identified factors as:

"*These factors are termed as demand factors, facility factors, service factors and managerial factors. Study of these factors had supported the critical examination of both of the airports."*

Another respondent has suggested that:

"*Managerial and service factor to me to the most important factors that has given rise to the concept of smart airport"*

4.2.2 Contrasting conventional airport practices at Cape Town International Airport and Kotoka International Airport practices with the Smart airport practices at Dubai International and Heathrow International Airport.

It had been discussed by Leung, Yen and Lohmann (2017) that the practices that the African Aviation Industry follows could be termed as the conventional airport practices that help the airports like Kotoka International and Cape Town International airport in successfully delivering their services.

From the developed procedure of making contrasts between the conventional practice of the Cape Town Airport and Rotoka Airport, it was analysed that the group performance between the companies can be contrasted (Hirsh, 2016; Thakur and Gupta, 2019).

Contrasting factors	**Cape Town Airport** (De Botton, 2010)	**Dubai International Airport** (da Cunha, Macário, and Reis, 2017)	**Heathrow International Airport** (Alansari, Soomro and Belgaum, 2019)
Prices of fares	Reasonable	Expensive	Expensive.
Air service quality	Hygienic	Technologically supportive.	Technologically supportive.
Airline loyalty	Loyalty is increased with business objectives.	Loyalty is increased with the technology usage.	Loyalty of airline is increased with the use of technology.
Ground access	Medium fleet of carriers	Large fleet of carriers.	Large fleet of carriers.

Contrasting points between Kotoka International Airport and the smart airports of Dubai International and Heathrow International are discussed below.

Contrasting factors	**Kotoka International Airport** (Park, and Ryu, 2019)	**Dubai International Airport** (da Cunha, Macário, and Reis, 2017)	**Heathrow International Airport** (Alansari, Soomro and Belgaum, 2019)

Fare prices	Practical	Costly	Overpriced
Quality of air services	Hygienic	Sanitised	Sterile
Loyalty of airlines	Normal loyalty	Increased loyalty due to introduction of technology	Increased loyalty with use of technology
Access to the Ground	All local and international flights with medium fleet	Local and international flights with large fleet	Local and international flights with large fleet.

In the context of interview responses:

One of the respondents has suggested that:

"*With the introduction of new technologies used for controlling the operation of the airports, the airports like Dubai international and Heathrow airport have attained their goal of flights. This is distinct from the hospital that have developed in South Africa*"

Another respondent replied as:

" I personally believe, the price factor make a significant differences among the airports you asked. The airports that has been developed in South Africa are very much cost effective"

It was further discussed by Ayuk and Oku (2017) that the operations of the Kataoka International Airport have to increase the efforts of increasing information sharing among the airlines so that they can easily handle their operations. These operations must be evaluated compared to the current smart airports of the Dubai International Airport and Heathrow International airport. In this manner, the level of contrast among the selected airports can be reduced (Ayuk and Oku, 2017).

4.2.3 Different types of problems associated with operations at Cape Town International Airport and Kotoka International Airport in comparison with Dubai International and Heathrow Airport.

When the airports are looking to conduct their operations in the market successfully, it was observed that the conventional airports like Cape Town Airport and Kotoka Airport can and are experiencing different operational problems that Smart Airports have resolved in Dubai International and Heathrow airport (Lykou, Anagnostopoulou and Gritzalis, 2019). It was explained by Feltus *et al.* (2018) that the general problems experienced by conventional airports while performing their regular operations are in connection with cargo handling problems, air traffic control, and capacity constraints at airports leading towards congestion and other safety issues.

All these mentioned challenges are compared among the selected conventional airports of South Africa and Ghana; and Smart airports of Dubai and the United Kingdom. The selected airport from South Africa was Cape Town International Airport. The airport selected from Ghana was Kotoka International Airport. The selected smart airport from Dubai was Dubai International Airport, and the smart airport selected from the United Kingdom is Heathrow airport (Quilty, 2018).

Types of problems / Existence in airports	**Cape Town International Airport**	**Kotoka International Airport**	**Dubai International Airport**	**Heathrow International Airport**
Cargo handling	Yes; multi-lingual	Yes; small	No; controlled	No; effective

	cargo contracts; non-dedicated carriers; trade agreements.	package shipment; absence of cargo aircrafts.	through effective technological usage.	control with advanced technological equipment.
Air traffic control	Yes; exponential traffic increase due to increased arrival of international flights	Yes; increased traffic of mid-size passenger and cargo planes.	No; Air traffic is managed through ARENA simulation.	No; most of the air traffic is governed by the implication of Communication, Navigation, and Surveillance (CNS) system.
Capacity constraints	Yes; night curfews; air travel demand increase.	Yes; emission budget and noise limit in the region.	No; effective capacity management through ERP usage.	No; effective capacity management through ERP system.

It was further discussed by Doheim, Farag and Badawi (2019) that the Governments of African countries had to develop and implement strong information-sharing systems to deliver the transportation services between the countries successfully.

One of the respondent have answered to the question as:

“ To me, cargo handling and air-traffic controlling capacity are considered as the major problems that I found inDubai International Airport and Heathrow Airport. “

Another respondent has suggested that;

"Yes, there is a considerable difference between the two categories. I find Cape Town International Airport and Kotoka International Airport less problematic when comparing the airports in term of problems or complexities"

4.2.4 Comparing the efficiency of Cape Town International Airport and Kotoka International Airport with Dubai International Airport and Heathrow Airport

According to the study of Van der Merwe and Von Holdt (2006), the efficiency of an airport is determined by the quality of service offered. However, the research of Hanly (2015) indicated that the workforce and staff play a dominant role in determining the efficiency of service provided at a particular airport. However, Asamoah-Baidoo (2011) research highlighted that Kotoka International Airport, located in Ghana, uses modern technology for managing the baggage and other airport operations system to make travel efficient for international travellers. Although, the study of Visitdubai.com. (2020) indicated that Dubai International Airport had been regarded as one of the best smart airports globally as it utilises the smart gate facility that allows the residents of the UAE to pass through without any restrictions. In contrast, the study of Gil, Miozzo and Massini (2012) emphasised smart boarding cards utilised at Heathrow International Airport, making the boarding operation favourable for international travellers.

Furthermore, the research of Akwei, Tsamenyi and Sa'id (2012) praised the Kotoka International Airport for managing 5 million passengers throughout the year and processing 1250 passengers in an hour, indicating the efficiency of the airport in managing their consumers. While the study of El Najjar (2018); Hong, Oh and Lee (2019) focused on one of the smart features known as the smart suitcase introduced at Dubai International Airport that has been

playing a key role in detecting explosives, drugs and other illegal objects that may harm the potential consumers. A similar author added that the purpose of introducing smart suitcases at Dubai International Airport is to ensure the efficiency of security at the airport (El Najjar, 2018). On the other hand, the research of Fattah et al. (2019) argued that Heathrow International Airport has been utilising smart data for efficiently managing the crowd and schedule of flights, which contributes to reducing flight delays and waiting time at the airport.

In addition, Holbech, Asamoah and Owusu (2015) 's dissertation states that African airports' efficiency depends on the government's intervention in managing the quality of service and crowd at multiple airports. Whereas the study of Antwi (2015); Karmakar and Sahib (2017) indicated that the idea of a smart airport could be implemented if the resources in African Nations are abundant as it plays a prominent role in bringing efficiency in operations and processes of the airport.

In terms of primary findings, one of the respondents has presented his viewpoint as:

"Cape Town International Airport has been considered as best airport of Africa as the travellers using this airport find extensive facilities such as renown restaurants, medical service, shops and prayer room that improves the overall journey of travellers."

Another respondent has suggested that:

"Cape Town International Airport has been regarded as most efficient airport of Africa due to its location. The similar author elaborated that the location of Cape Town International Airport is considered as convenient place for travel stays as Cape Town International Airport offers advance lounges and transport service along with inclusive duty-free section at the international departure halls."

4.3 Discussion

4.3.1 Role of smart airports in the aviation industry inAfrica

It has been discussed by Lekota and Coetzee (2019) that managing the operations of the overall aviation industry of Africa is difficult as air transportation is one of the main transport for the country in attaining globalisation goals. Moreover, the International Air Transport Association (IATA) expects increased air travel due to increased tourism (Taylor, 2016). It has been described by Dube and Nhamo (2019) that the African Aviation Industry have to imply other tactics for controlling the increased traffic. Expanding the airport area and using bigger aircraft are expensive options.

Therefore, Bogicevic *et al.* (2017) identified that airport management practices are distributed among different practices. Each element developed for effectively managing airport management operations is unique from other operations. This requires developing and implementing the airport management system based on the internet of things. Such an airport management system is implemented in the airport's system to make them the smart airport (Martin-Domingo, Martín and Mandsberg, 2019).

In relation to African Aviation Industry, use of smart airports in Africa can help them deliver the required management solutions. The implication of smart airports in the African Aviation Industry will be based on developing operations room automation in conventional African airports (Jumi, 2019). The operation room will become the core of the smart airport. This type of room can help the airports of the African Aviation Industry manage flight check-in and check-outs of passengers and their luggage list, which supports effective and secure travelling from one place to another (Jumi, 2019).

It was further mentioned by Kratudnak and Tippayawong (2018) that the use of smart airports will help the airport management of African airports in managing the movement of luggage with the passengers and will guide them to the exact location of their luggage. It was further explained by Kratudnak and Tippayawong (2018) that the use of smart airports has been supportive of identifying the list of registered passengers with their luggage so that their check-in and check-out can be identified.

4.3.2 Problems experienced by the African Aviation industry in developing and implementing smart airports

With the thirteen countries being landlocked in a single continent of Africa, air travel is one best option. It has also been discussed by Mohamed, Gomaa and El-Sherif, (2018) that there are many problems experienced by Africa's aviation industry while developing and implementing smart airports. One of the many challenges experienced by the African Aviation Industry is related to the lack of domestic flights between the countries of Africa. Secondly, the other problem experienced by the African aviation industry is the number of stops made by flights while reaching a single destination within the continent (Lekota and Coetzee, 2019). It was further analysed by Syltevik *et al*. (2018) that the other problem that the African Aviation Industry experiences (AAI) in developing and implementing the mart airports is based on the visa restrictions imposed between the countries of Africa.

Another problem identified by Wu, Cheng and Ai (2018) of the AAI in implementing smart airports is based on the limited availability of the infrastructure and workforce in the continent. It was further addressed by Wu, Cheng and Ai (2018) that aviation practices positively impact the country's economic progression. But, with the continent's lack of working

infrastructure due to poverty and other economic drawbacks, the successful implication of the Smart airports in the region is somewhat impossible.

4.3.3 Comparing the efficiency of smart airports

It has been discussed by Straker and Wrigley (2018) that the definition of a smart airport is mainly synonym with the concept of the smart city. This is because smart cities use technological opportunities in a much better way that can help them deliver a sustainable smart living environment. It was also supported by Nagy and CSISZáR (2016) that the information infrastructure, like smart airport practices, is best developed in smart cities. Therefore, when cities have their established information infrastructure, they can easily observe the smart airports.

This is because the developed smart airports are the subsystem of the smart countries and cities. It was further researched by Maigha and Crow (2018) that smart airports are developed in smart countries to manage passenger transport effectively. It was further discussed by Maigha and Crow (2018) that the smart airport system would be difficult to implement in African countries. This is because the African economy does not have such sort of information infra-structure that supports the use of smart technologies in the communication and travel system. It was further explained by Shafei, Tawfik and Khalil (2019) that using smart airports requires establishing strong and smart communication infrastructure that can help the countries of Africa build smart countries that support smart airports.

Otherwise, managing the effective control of conventional airport operations can be difficult. It was further explained by Pineda *et al*. (2018) that the development of smart airports in the African Aviation Industry is the demand for future success. This demand must be met by the country's government so that the effective operations of the aviation industry can be

performed. It was further described by Pineda *et al*. (2018) that smart airports could bring an adequate level of change in the transportation of passengers moving within or outside Africa countries.

4.4 Chapter summary

The current chapter analyses the findings of the research that were conducted through the use of secondary research on the articles for making effective comparisons among the practices of selected airports for understanding the practices of smart airports so that they can be implied in the conventional African airports. The chosen conventional African airports were Cape Town International Airport and Katoka International airport. The smart airports chosen for comparison are Dubai International Airport and Heathrow International Airport.

The developed comparison analysis was based on four different points. The first point was based on the critical comparison of the factors that lead towards the implication of smart airports in the countries of Africa. Different factors were developed and analysed after effectively comparing the factors used in the conventional airports of South Africa and Ghana. It was further explained in the results chapter that the contrasts were developed among the conventional and smart airports for delivering their services to the passengers of the African countries.

It was further discussed in the research chapter that smart airports could support the growth of Africa's aviation industry. With the use of smart airports, the economy of African industries can emerge from the pitfall of the conventional airport system. Still, it requires great investment in terms of communicational infrastructure in the continent.

CHAPTER 5: CONCLUSION

5.1 Introduction

The current chapter discusses the findings and conclusion pertaining to the implication of smart airports in Africa for the African Aviation Industry. The research primarily focused on renowned smart airports worldwide that have been playing a vital role in making their service efficient. The study aimed to highlight the factors that lead towards the implication of smart airports in the African Aviation industry. The study included two major and busiest African airports: Cape Town International Airport and Kotoka International Airport. At the same time, the smart airports of Dubai International and Heathrow Airports were considered for comparative analysis. Another objective of the study was to analyse the problems experienced by the African Aviation Industry in managing smart aviation operations. The last objective was to assess the effectiveness of Cape Town International Airport and Kotoka International Airport compared with Dubai International and Heathrow International airports. The current study used secondary sources such as journals, articles, magazines, books and websites to collect data. Moreover, the research employed a comparative content analysis technique for analysing the phenomena. While the current chapter, the researcher discusses the study's findings and provides a relevant yet succinct conclusion based on recommendations.

5.2 Summarised Findings

The findings of the current study evaluated four major factors that have played a vital role in promoting the implication of smart airports at Cape Town International Airport and Kotoka International Airport. The factors were demand, service quality, quality of facilities and managerial factors. To elaborate, the findings reflected that African nations tend to have low

demand for smart airports, which has affected the African Aviation Industry in promoting the establishment of smart airports. Additionally, it has been found that a lack of monetary resources has restricted Cape Town International Airport and Kotoka International Airport from providing qualitative service. Furthermore, the comparative analysis has also indicated that the services at Cape Town International Airport include security, customer care, and comfort level, while the primary emphasises of Kotoka International Airport has been on general aviation, air navigation and air freight services in terms of service factors. Furthermore, the findings also evaluated that customs, baggage reclaims, and passport control is major facilities provided at Cape Town International Airport, while baggage reclaims, customs, and other passport controlling practices are some of the facilities provided at Kotoka International Airport. Regarding managerial factors, Cape Town International Airport has focused on growth while Kotoka International Airport has emphasised meeting organisational and passenger needs.

Furthermore, the conventional airport practices at Cape Town International Airport and Kotoka International Airport were compared with the Smart airport practices at Dubai International and Heathrow International Airport. By conducting the comparative analysis, it has been found that prices of fares are reasonable at Cape Town International Airport and Kotoka International Airport. On the other hand, Dubai International Airport has high fares, whereas Heathrow International Airport has overpriced fares. Another practice that has been compared is the quality of air service. By analysing the content, it has been evaluated that Kotoka International Airport has hygienic air quality, whereas Dubai International and Heathrow International Airport has sanitised and sterile air quality, respectively.

In addition, the evaluation of different types of problems associated with operations at Cape Town International Airport and Kotoka International Airport in comparison with Dubai

International and Heathrow Airport indicated that Cargo handling, air traffic control, capacity constraints and other safety issues were prominent problems that differentiate the service of conventional and smart airports.

Lastly, the efficiency of Cape Town International Airport and Kotoka International Airport compared with Dubai International Airport and Heathrow Airport evaluated that the government plays a prominent role in determining the efficiency of service offered at the airport. Moreover, the abundance of resources and choosing a strategic location for establishing the airport have been key determinants that contributed to making airport services efficient.

5.3 Recommendations

By conducting the comparative analysis of the study, the recommendations are based on highlighting the areas where the major African airports, such as Cape Town International Airport and Kotoka International Airport, can work in order to convert their conventional airport service to a smart airport like Dubai International Airport and Heathrow Airport:

- On examining the findings derived from content analysis, it has been identified that some government has low intervention in developing airports across Africa. Major government of African nations does not consider investing in the aviation sector to be productive. Thus, it is recommended that to promote the implication of smart airports for the African Aviation Industry, governments of multiple African nations such as Cape Town and Kotoka must show interest in innovating the conventional airport to smart airports to attract tourism towards Africa.
- Moreover, the findings also evaluated the lack of awareness of the benefits of having a smart airport. Hence, to encourage the implication of smart airports in African nations, it

is recommended that African Aviation Industry must take the initiative by presenting the example of Dubai International Airport and Heathrow International Airport that how these airports have attracted a considerable number of consumers after began offering smart facilities at their airports. The purpose of conducting a comparative analysis is to identify the needs that smart airports meet. The problems such as loss of luggage and other valuables can be minimised by having a smart airport in a nation.

- Additionally, by examining the findings, it has been identified that smart airports tend to increase the level of security at the airport. Thus, in light of such findings, it is recommended that African nations adopt smart airport as it improves the overall experience of travellers by ensuring maximum security, just like Dubai International Airport, where smart suitcases are used for detecting threats like explosives, drugs and other illegal substances.
- Lastly, by examining the critical comparative analysis, it has been found that smart airport tends to generate new revenue streams for a nation. Since most of the nations of Africa lie in the third world category thus, adopting smart technology at major African airports such as Cape Town International Airport and Kotoka International Airport would create opportunities for employment for international as well as local individuals leading towards increasing gross domestic product (GDP) for the nations.

5.4 Future Implications

Since the study's primary aim was to analyse the implication of smart airport to African Aviation Industry, the study would provide extensive information about smart technology being employed in major smart airports across the world. Additionally, the current study would allow

the existing airports of African nations to become efficient in providing productive service to international travellers. Moreover, this study would assist other researchers in future research on similar phenomena. It would also assist in differentiating the services of conventional airports from smart airports, as the current study compared two major airports in Africa with two renowned smart airports worldwide. The current study highlighted measures that would improve the operations of conventional airports in Africa. Furthermore, this study would be useful for authorities working at airports as it has identified the major concerns experienced by travellers using conventional and smart airports. This research would be helpful for travellers as the study has emphasised one of the major issues consumers face, such as losing luggage and long queues, that can be solved by establishing smart airports across Africa.

5.5 Conclusion

This dissertation is based on the prominence of introducing smart airports to deal with the current and future problems faced by the African aviation industry. The study emphasised airports in African nations by highlighting the major issues faced at these airports. Moreover, the minimum role of government in solving these concerns created the need for conducting this study. The current study attempted to find the factors leading towards the implication of smart airports in the African Aviation industry, the problems experienced by the African aviation industry in managing smart aviation operations and the effectiveness of Cape Town International Airport and Kotoka International Airport in comparison with Dubai International and Heathrow International airports. The study used primary and secondary data to collect information on the effectiveness and problems associated with conventional airports that have been compared with renowned smart airports such as Dubai International Airport and Heathrow International Airport

to contrast the benefits and issues of both kinds of the airport. The results evaluated that the major issues such as losing luggage, weak security and navigation and considerable delays and waiting time at boarding and check-in have been the primary concern experienced by travellers. Whereas the implication of smart gates and smart suitcases at Dubai International Airport played a prominent role in eradicating the issue of losing luggage and weak security. Additionally, the smart airport of Heathrow employs smart data features to reduce the issue of delays and waiting times for boarding and check-in at their airport.

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APPENDIX A: INTERVIEW QUESTIONS

1.What factors according you have given rise to the concept of smart airports?

2.How do you compare and contrast Kotako International Airport, and Cape Town International Airport in comparison of Dubai International and Heathrow International airport?

3. What problems do you think are associated with operations at Cape Town International Airport and Kotoka International Airport in comparison with Dubai International and Heathrow Airport?

4. In terms of efficiency, how do compare Cape Town International Airport and Kotoka International Airport with Dubai International Airport and Heathrow Airport?

TRANSCRIPT 1

1.What factors according you have given rise to the concept of smart airports?

The factors such as demand factors, facility factors, service factors and managerial factors. Study of these factors had supported the critical examination of both of the airports.

2.How do you compare and contrast Kotako International Airport, and Cape Town International Airport in comparison of Dubai International and Heathrow International airport?

With the introduction of new technologies used for controlling the operation of the airports, the airports like Dubai international and Heathrow airport have attained their goal of flights. This is distinct from the hospital that have developed in South Africa.

3. What problems do you think are associated with operations at Cape Town International Airport and Kotoka International Airport in comparison with Dubai International and Heathrow Airport?

To me, cargo handling and air-traffic controlling capacity are considered as the major problems that I found on Dubai International Airport and Heathrow Airport.

4. In terms of efficiency, how do compare Cape Town International Airport and Kotoka International Airport with Dubai International Airport and Heathrow Airport?

Cape Town International Airport has been regarded as most efficient airport in Africa due to its location. The similar author elaborated that the location of Cape Town International Airport is considered as convenient place for travel stays as Cape Town International Airport offers

advance lounges and transport service along with inclusive duty-free section at the international departure halls.

TRANSCRIPT 2

1.What factors according you have given rise to the concept of smart airports?

Managerial and service factor to me to the most important factors that has given rise to the concept of smart airport"

2.How do you compare and contrast Kotako International Airport, and Cape Town International Airport in comparison of Dubai International and Heathrow International airport?

I personally believe, the price factor make a significant differences among the airports you asked. The airports that has been developed in South Africa are very much cost effective

3. What problems do you think are associated with operations at Cape Town International Airport and Kotoka International Airport in comparison with Dubai International and Heathrow Airport?

Yes, there is a considerable difference between the two categories. I find Cape Town International Airport and Kotoka International Airport less problematic when comparing the airports in term of problems or complexities

4. In terms of efficiency, how do compare Cape Town International Airport and Kotoka International Airport with Dubai International Airport and Heathrow Airport?

Cape Town International Airport has been considered as best airport of Africa as the travellers using this airport find extensive facilities such as renown restaurants, medical service, shops and prayer room that improves the overall journey of travellers.”