

Exploring the Potentiality of Applying Smart Airport Technologies in Egyptian International Airports

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Abstract

With the continuous growth of air traffic, many airports have become transportation hubs for people, information and trade. They have also become more entrepreneurial and proactive to the changing aviation dynamics. This has urged many airports across the globe to implement new technological self-service solutions such as robotics kiosk, facial recognition, automated passport control, and others to be able to manage airport operations effectively. Many companies have also been concerned with the introduction of advanced technology solutions and systems such as communication systems, non-aeronautical systems, and security systems for airports in order to provide value added services to passengers. The current paper aims at exploring the potential opportunity of applying smart airport technologies in the Egyptian airports through the distribution of a show card on four key representatives of the aviation industry in Egypt during the conduction of in depth semi-structured interviews with them. The paper concludes with insights regarding the smart airport tools and solutions that can be implemented in Egyptian international airports.

Key words: Airlines, Passenger experience, Smart airports, Self-service solutions.

Introduction

The concept of smart airports has currently become a general concept in the aviation industry worldwide with airports becoming more hyper connected and digitally focused and passengers becoming more eager to experience the increased levels of control and the diversified range of self-service technological devices that a smart airport can offer (Hirsh, 2016). This apparently requires not only financial investment but also a deeper understanding of passengers in terms of demographics, behaviors, attitudes, and needs as well as stronger collaboration between airlines and airports (Chesher, 2013).

Generally speaking, most smart airports focus on creating a more streamlined passenger experience, with various touch points providing information to passengers. Airports stand to benefit from these advances, with a higher likelihood of repeated customers and the opportunity for increased revenues through up-selling possibilities and targeted advertising. Thus, the more opportunity for digital interaction, the better experience will be for both operators and passengers and with the majority of airports recognizing this approach, the smart airport of the future is set to very soon become the smart airport of today (IATA, 2016).

In 2016 for instance, 85% of passengers reported a positive travel experience with a 5% increase than 2015 as a result of the increased investments in information technology tools and services which enabled travellers to have control over many parts of their journeys such as flight booking, checking-in, getting boarding passes, security screening, passport control, baggage collection, etc. Whereas, in the cases of limited (or even zero) self-service options, passengers reported higher levels of negativity (SITA, 2017).

Literature Review

Central to the concept of smart airport technologies are a number of systems comprising solutions, devices, components, and services that automate the usage of airways infrastructure to carry out advanced functions which make travel to the

different destinations easier and less stressful as it contributes to overcoming many of the problems that passengers encounter during departures, arrivals and stopovers in international airports (i.e. the changes in flight schedules, long waiting periods during flight check-in, etc.) particularly during congestion periods. This may result sometimes in negative travel experiences (Smith, 2016).

These systems are collectively known as “Smart airport systems”. They include several components such as passenger reservation and information systems, flight operations information systems, air traffic management, operations, baggage and check management, security monitoring, communications, ticketing, airways analytics, etc. (Kamel, 2015).

In this respect, information systems - particularly mobile notification services - are among the most important smart airline technologies due to their role in facilitating the flow of information between the airlines, the airport authorities and the passengers who can access information and receive flight announcement immediately through their mobile devices which in turn contributes much to the enhancement of airports’ operations on one hand and to the enhancement of the airlines’ customer loyalty on the other hand (Kamel, 2015).

Hence, mobile notification services are nowadays of core interest to most international airports and are expected to remain dominant due to the high demand for integration of smart airport applications to track, manage, and share accurate, up-to-date information in real-time with all airport stakeholders (Cooper et al., 2018).

Additionally, airports can grow non-aeronautical commercial revenue simply by expanding services in areas such as retail, hospitality, parking, and real estate. To fully maximize the value of these services, however, airports need to adopt a customer-centric approach focused on enhancing the passenger experience (Cooper et al., 2015).

Thus, one of the main goals of smart airport technologies is to enhance the passenger’s end-to-end travel experience through investing in digital systems and processes that are interconnected, infused with intelligence and simply accessed by everybody. Additionally, smart airport systems and solutions are intended to improve the efficiency of operational process, enhance the productivity of staff and ensure security and safety considerations. The main idea in this regard is to create an integrated system, unified and ready to use a digital platform that facilitates the flow of passengers to and from the various destinations (Budd, 2017) provided that the current developments in the manufacturing of aircrafts with larger carrying capacities have put more pressures on the competence of airports to undergo efficient airline operations that meet the needs of passengers and achieve their satisfaction (Kershaw, 2016).

According to Button and Stough (2014), smart airport technologies have produced various tools and applications that contribute to the enhancement of passengers’ end-to-end travel experiences among which are the following:

- **The Smart Lane:** which is the flight security inspection point where customers’ carry-on baggage is inspected and a physical inspection at the body scanner and the metal detector gate is conducted.
- **The Smart Screen Technology:** which displays taxi and train information as well as prices and travel information in real time.
- **The High-Tech Mirror:** which is a Web-connected mirror that enables passengers to share images and videos of their potential purchases on social media.

- **The Sophisticated Motion Sensor System:** which is a system that allows the airport to track queues in real time.
- **The Smart Wallet:** which is a service that allows passengers to simply tap their phone to the screen instead of procuring a travel document.
- **The Smart Tunnel:** which is a biometric system that allows passengers to simply walk through the tunnel without showing their passports. It works on face recognition technology and helps passengers finish entry procedures within 15 seconds.
- **The Beacon-enabled App:** which is a smartphone app that provides travelers with helpful information.
- **The Airport Staff Smartwatch:** which helps in identifying the exact location of staff in order to assign and communicate tasks specific to their locations within the airport premises.
- **Smart Parking:** which enables customers to easily part their cars and have it ready as soon as they return back to the garage through linking the booking to their flight details.
- **Smart Boarding:** which is a self-boarding and access control to airline lounges.

Additionally, Castro (2016) has referred to the various benefits that airports may achieve through the implementation of smart solutions including:

- Greater ability to up-sell and cross-sell personalized services (i.e. offering valet parking to travelers arriving late for a flight, providing hospitality services in the event of a delay, etc.) based on real-time information and status of the travel environment.
- Increased retail revenues can be generated through destination-specific shopping discounts and offers and pre-trip information about goods and services that exist in the airport terminals.
- Ability to use integrated passenger information linked to events and conditions such as weather, traffic, and seasonal trends over time to model the future and improve the travel experience.
- Introduction of intelligent, location-based services, including way-finding to move people through an airport at an optimum rate to maximize spend and minimize delay; ability to provide trusted travel advice and preferential treatment based on passenger segmentation.

Central to this, Abeyratne (2017) explained that smart airport technologies will extend their value chain beyond traditional airports, where they can create innovative services that enable value creation among partners in information-intensive businesses such as logistics or maintenance repair and overhaul. In the same context, Gast (2017) indicated that the use of smart airport technologies contributes much to the delivery of enhanced passenger experiences and the improvement of operational efficiency claiming that it is only a matter of time before it becomes a mainstream to the infrastructure of international airports across the world. Whereas, Kouidri (2018) claimed that smart airports are not just intelligent infrastructures but a combination of various stakeholders including airport operators, airlines, ground handlers, passengers, authorities and regulators, who can efficiently collaborate by eliminating the barriers to information flow.

Research aim

The current research aims at exploring the potentiality of applying smart airport technologies in Egyptian international airports with particular consideration to the reasons behind that.

Research methodology

The current study adopted a pragmatic qualitative approach that was based on two phases of data collection and analysis. In the first phase, secondary data was collected from a range of relevant publications while in the second phase, primary data was collected by using a show card that was carefully designed to explore the potentiality of applying the ten previously-mentioned smart airport technologies in the following Egyptian international airports: Cairo International Airport, Sharm El Sheikh International Airport, Marsa Alam International Airport, and Luxor International Airport. The Show Card method was used as a supporting tool in assessing the potentiality of each of the four airports on a separate basis (table 1).

The show cards were filled in during extended semi-structured interviews that took place in June 2018 with the Head of Cairo Airport Insurance Investigation, Head of the State Security Bureau at Cairo International Airport, Head of Egypt Air Technical Office, and Former president of the Egyptian aviation authority. The interviewees were selected due to their extended experience in the airport industry particularly at the operational and security levels. According to Lee (2009), five different approaches have been exploited in order to evaluate the smart technological tools, among which is the industry experts' judgment approach, which is exploited to accurately evaluate the industry experts' satisfaction or perceptions.

Results and discussion

The analysis of the interviews revealed the following:

- All of the interviewees agreed that Smart Lanes are not implemented in Egyptian airports as according to safety and security regulations, passengers have to pass by three strict checkpoints before boarding. The interviewees also added that the Fingerprint Technology was planned to be implemented instead of boarding pass since 2017 but it has not been yet put into practice due to the lack of sufficient funds. However, as soon as the funds are allocated, it will be implemented in all Egyptian airports specially that it has been requested by the International Civil Aviation Organization (ICAO).
- As for the Smart Screen Technology, it has been indicated that it is not applied however, it could be easily applied in all Egyptian airports and that it could be used successfully as a marketing tool in the promotion of the different services and facilities available at the airport provided that they could be self-funded by the advertising companies.
- The High-Tech Mirror was also reported as not being applied but could be possibly applied to cater for the needs of leisure travelers particularly that it is used to promote the different attractions at the destination. Thus, it was highly recommended to be used in Sharm El Sheikh, Hurghada and Marsa Alam International Airports. Similarly, the Sophisticated Motion Sensor System was indicated as not being applied but could be implemented at Cairo International Airport, being Egypt's busiest airport, due to its contribution to the management of long queues during busy periods. However, its implementation in airports with smaller capacities was not recommended by the interviewees.

- As for the Smart Wallet, all of the interviewees totally agreed that it is quite hard to be implemented in Egyptian airports as it requires the allocation of huge funds which could be better oriented towards other smart airport technologies that come on top of priorities at the meantime. Moreover, it has been indicated that many passengers are not yet familiar enough with the concept of the Smarts Wallet. Similarly, Smart Tunnels were reported as not being implemented as well as not being feasible to be implemented in Egyptian airports due to its high cost. Additionally, the interviewees reported that the infrastructure of the Egyptian airports would not currently support the establishment of smart tunnels adding that such technology is only available in Dubai International Airport.
- All the four interviewees also indicated that the Beacon-enabled App has been implemented in a very simple way as in the case of Cairo International Airport app and the Egypt Air app. Whereas, no other Bacon-enabled apps are present. They also recommended that more investments should be put to apply such technology in all Egyptian international airports especially that it is considered a low cost investment.
- The four interviewees further agreed that the Airport Staff Smartwatch is a simple and effective means of communication between airport staff particularly during emergency situations provided that it is of low cost investment compared to the benefits it provides. It has also been recommended to use smartwatches in all Egyptian airports. All interviewees also stated that Smart Parking has not also been applied in Egyptian international airports, and that it is quite difficult to be adopted as it is of a very high cost which makes it not a top priority for Egyptian airports. Smart Boarding was also not applied in Egyptian airports despite the fact that it can be easily applied in Egyptian international airports.

The previous results support the argument of Kouidri (2018) that smart airports are not just intelligent infrastructures but a combination of stakeholders who efficiently collaborate to provide better travel experiences through the elimination of the barriers to information flow within the airport environment. Nevertheless, due to financial constrains in the Egyptian context - as reported by the interviewees- the application of some of the afore-mentioned technologies seems quite difficult at the mean time despite the ample benefits they provide, particularly that some of them require infrastructural adjustments which are not easy to achieve in short-term plans as in the case of Smart Tunnels and Smart Parking. On the other hand, the results indicate that some smart airport technologies such as Beacon-enabled Apps, Airport Staff Smart Watches, Smart Boarding and Sophisticated Motion Sensor System can be easily implemented. Other tools such as High-Tech Mirrors and Smart Screens were also referred to as potential technologies particularly that they contribute much to the promotion of the different services and facilities available at the airport provided that they could be self-funded by the advertising companies. The High-Tech Mirror was also regarded as a potential technology particularly that it is used to promote the different attractions at the destination which in turn contribute to the extension of the value chain beyond the Egyptian airports as suggested by Abeyratne (2017).

Based on the interviewees' previously mentioned opinions, the following table represents the analysis of the show cards according to their perceptions regarding the potentiality of applying the ten previously-mentioned smart airport technologies in each of the four identified airports: Cairo International Airport, Sharm El Sheikh International Airport, Marsa Alam International Airport, and Luxor International Airport.

Table 1: Potentiality of applying smart airport technologies in different Egyptian airports

Smart Tools	Cairo International Airport	Sharm El-Sheikh International Airport	Hurghada International Airport	Marsa Alam International Airport	Luxor International Airport
Smart Lanes	✓	✓	✓	✓	✓
Fingerprints Technology	✓	✓	✓	✓	✓
Smart Screen Technology	✓	✓	✓	✓	✓
Sophisticated Motion Sensors	✓	X	X	X	X
High-Tec Mirrors	X	✓	✓	✓	X
Beacon-enabled technology app	✓	✓	✓	✓	✓
Airport Staff Smart Watches	✓	✓	✓	✓	✓
Smart Boarding	✓	✓	✓	✓	✓
Smart Wallets	X	X	X	X	X
Smart Tunnels	X	X	X	X	X
Smart parking	X	X	X	X	X

In this context, it would be more feasible to start by applying smart airport technologies at Egyptian international airports like Sharm El Sheikh and Hurghada airports. This is due to the fact that these airports receive international tourists who would appreciate using such technologies that offers them better travel experience.

Conclusion

Today, smart technologies have a clear impact on the operation of airports due to the various solutions they provide to overcome the challenges that airports encounter as a result of the increase passenger flow particularly during peak periods. The analysis of the show card gave insights regarding the smart airport tools and solutions that can be implemented in each of the four identified Egyptian international airports as well as the tools that can not be applied with reference to the reasons behind this. This may consequently contribute to setting the future plans of development of Egyptian airports particularly when it comes to the introduction of smart technologies and the decision of whether it is feasible or not to implement any of these technologies.

Recommendations

The following recommendations are directed to the Egyptian Holding Company for Airports and Air Navigation (EHCAAN):

- 1- In order to leverage the experience of the passengers and travelers, it would be beneficial to put short and long term plans for the adaptation of the functions and operational processes of the Egyptian international airports to employ the smart airport technologies and solutions.

- 2- Short term planning should include the implementation of a number of smart technologies such as; Beacon-enabled Apps, Airport staff Smart Watches, Smart Boarding, Sophisticated Motion Sensor System, High-Tech Mirrors and Smart Screens since these smart tools can be easily implemented because they do not require a complicated infrastructure.
- 3- Long term planning should include the implementation of a number of smart technologies such as; Smart Tunnels and Smart Parking as these smart technologies require highly infrastructure reforms and modifications on one hand and big investments and financial allocations on the other hand.
- 4- Funds required for achieving the aims of short and long term plans could be provided through bank loans.

Besides, it could be mentioned that, it is recommended that the Egyptian Holding Company for Airports and Air Navigation - in collaboration with the Ministries of Civil aviation and Information and communication technology - puts more emphasis on investing in integrated operation and information infrastructure with particular consideration to the exploitation of new airport technological trends, the reinforcement of strategic decision making according to definitive and reliable market-driven data and the identification of potential business opportunities and partnerships with the private sector.

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