A Study on Passenger Experience using Smart Security System in Dubai Airport

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Abstract--- Nowadays, many travellers preferred to travel by air as it is faster and more comfortable in comparison to other transportation modes. Moreover, due to the competition in the aviator sector, the air transportation become more economical and affordable, which attract more passengers. Along with this development, the role of an airport becomes more important especially in term of its security infrastructure in order to enhance the passenger experience. This is because the security process and services involved in every phases of passenger's travel lifecycle. However, these security process and services often impinge on the passenger experience. Therefore, in this preliminary study we aimed to analyse the current problem face by passenger when using airport security system such as smart gate. From the result, we discover that most of the passenger don't feel secure after going through the security screening.

I.   INTRODUCTION

Airport is known as one of the most complex system in transportation sector. However, it become one of the dominant and preferred travelling options by most travellers. Statistic shows that there are 420,870 planes registered in 2016 that can accommodate around 250 or more passengers. This is an increment from around 373,534 in 2013, when aviation is relatively new [1]. This development has necessitated the existence of more than one airport in many world cities, including United Arab Emirates (UAE).

The UAE airline has become one of the most preferred forms of transportation because it is faster and more comfortable than other transportation modes. Moreover, in recent years, due to the competition in the aviation sector, the fact that air transportation has become more economical has also had a serious effect on the preference of air transportation [2]. The number of passengers in domestic and foreign airlines in 2017 was approximately 88,242,099 in comparison to approximately 83,654,250 in 2016, 78,014,838 in 2015 and 70,473,893 in 2014. This shows a significant increment occurred in approximately 25% until 2017 [2]. This increment of passengers bought significant improvement in the airport and their current situation. Along with this, it has also triggered the need to design a new airport or extending the existing airports. Like other Emirates in the UAE, the Dubai International Airport was also built and expended several times to fulfil the needs and increasing number of passengers. It has been constructed with the new terminal buildings for international flights and has been separated from each other [3].

Along with the development, the security infrastructure of the airport has become the other centre of interest. This is because the security process and services involved in every phases of passenger's travel lifecycle. However, these security process and services often impinge on the passenger experience. For instance, the airport screening often caused long waiting lines at the screening points which leads to unpleasant experience. A recent survey found that there is a need to improve and shorten the screening process. However, it may increase the security problems at the airport. As improving the passenger's experiences become the utmost important, there is a necessity to model and develop the security infrastructure of the airport through the focus of the needs, contexts, behaviours, and emotions of the passengers.

Therefore, in this study, we conducted quantitative survey with few passenger experiences using smart security gate in Dubai Airport. The objective of this survey is to analyse the current problem face by passengers when going through airport security system such as smart gate.This survey was participated with 108 of passengersat Dubai Airport. This survey was conducted through paper based and online base methods, where all participants are treated anonymously.

The remainder of this paper is organized as follows: Section 2 outlines the background of the study; Section 3 presents the research design of our survey study; Section 4 discusses the result of the survey; Section 5 describes the discussion and lesson learnt and finally Section 6 concludes this study.

II.   BACKGROUND OF STUDY

a. Airport Smart Security System

The origin of smart security system was first developed by the Airports International Council (ACI) and the International Air Transport Association (IATA). The system is being used in advanced airports of the Europe and the USA. The important aspect of smart security system is its new smart lanes that have increased the capacity of airports by more than 1.5 times to improve the time needed for travellers to go through screening process. The smart lanes at airports speed up screening process for baggage as it moves trays automatically; and passengers move through security to be screened by scanners and they walk through metal detectors [4]. Most of developed country airports are embracing latest technologies in airports to enhance customers' experience. Likewise, London Stansted is that airport that developed its 20 self-service smart gates in 2013

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to help travellers scan their boarding cards before they enter the screening area [5].While, Dubai has 68 smart gate at Abu Dhabi Airport in 2018 [

The introduction of smart security system in airport setting has facilitated the users, particularly in terms of reduced queuing time [6]. Instead of all, there are different aspects of the new system that should be explored to make the smart security system more effective and efficient in in terms of enhancing passengers' experience. There are several studies that focused smart security systems at airports, however, they have neglected how the smart security system increases the satisfaction of the customers and lead to a positive experience. For instance, in a study by Alghadeir & Al-sakran (2016) on smart security system integration in airport, only highlighted the role of integrating airport analytics in disintegrated systems to analyse the past performance and to predict performance in future. However,

the authors completely neglect how this aspect contributes in improving the experience of the passengers by developing a positive sense of security.

Similar study by Bouyakoub et al. (2017) have proposed an airport management system based on the IoT paradigm, where passengers, baggage, plane or the departure lounge are considered as "things". The smart airport management system aims to automate passengers' processing and flight management steps, in order to improve services, facilitate airport agents' tasks and offer passengers a pleasant and safe journey. Similarly, this study focused on the IoT based solution for airport management but neglected the aspect of people who interacting with the "things". With this regard, we further investigated the human concerns on the common security systemtechnology used in the airport such as closed-circuit television (CCTV), security scanners, dynamic signage, and biometric as summarized in Table 1.

Table 1: Human Concern on Security System/Technology Used in Airport

Security System/Technology	Human Concern
Video surveillance (Closed Circuit Television)	Passengers' privacy, misuse of video recording and personal information
Security scanners (body scanner, smelling and scanning devices, baggage scanner)	Violation of individual privacy and discomfort [9], insider threats [10], mislaid, lost and damage baggage [11]
Dynamic signage / wayfinding	May confuse the aging and inexperience passenger (Bellioti, 2008)
Biometric	privacy, slowdown of the passengers' movement and processing, Unauthorized Physical Access [10], Insider Threat / Data Breach [10], Intentional Data Alteration [10].

b. Passenger Experience

Passenger experience, like all other human experience, is subjective and influenced by the context in which it takes place: the place, time, and interactions with others [12], [13]. Popovic et al. (2009) describe airport passenger experience as the "activities and interactions that passengers undergo in an airport (terminal building)". They categorize passenger experience into two broad categories, namely (a) necessary activities and (b) discretionary activities. Necessary activities are those that must be completed by a passenger in a set order, for example check-in, security, customs, boarding. Discretionary activities, on the other hand, are optional and unordered, for example, a passenger may exchange currency and/or have a cup of coffee or choose to do neither.

III. STUDY GOAL AND METHOD

This section described the design of our study. Our quantitative study seeks to analysethe current problem face by passenger when using airport security system such as smart gate.

a. Respondent Background

For this study, the respondents were 108 random passengers in Dubai Airport. The sample subjects participating in this study was on a voluntary basis and agreed to participate in the survey. Prior to the survey, they were provided with written informed consent form. They were informed that: (i) the survey is not mandatory, (ii) their participation will be treated anonymously, (iii) participation

in this survey is completely voluntary and (iv) data collected will be used only for research purposes.

b. Study Procedure

The following were carried out during the survey. Firstly, we designed the questionnaire to address the objective of the survey. A draft of the questionnaire was subjected to pre-test and verification by the experts, resulting in modifications to the questionnaire both in terms of question wording and length. Next, the questionnaires were distributed by our researchers to the passengersin Dubai Airport and a total of 108 of respondent took part in answering this survey. The results were analysed using survey monkey to identify the percentage of similar variables (responses). In order to do this, the variables were prepared based on the possible answers that correspond to the respective questions. To avoid biasness, all variables were validated by an expert.

c. Data Analysis

The demographic characteristics of the sample obtained via the selection method described above. The data collected have been weighted statistically to bring gender and age into their proper proportions for the population. Once the data collection element of the study was completed, the overall data sets that were collated were edited, coded and converted into quantifiable sets. This facilitates subsequent analysis, drawing inference and conclusion.

IV.   RESULTS

From the result of the survey, we have identified the background of the sample and characterized by gender. As shown in Figure 1, 89% of the respondents involved in this survey are male and follow by 11% are female. By referring to the figure, it shows that a higher percentage of respondents in this sample was males. Many people in Dubai Airport who undergo the airport security system are male, this is because men are more influences on travel. In addition, male travels more compared to female because of the commitment in their job and family.

Based on the Figure 2 shows the respondent's age in survey. The percentage of group 31-40 years old is the highest percent that response in survey. The percentage of respondents in group 21-30 years old are 11 percent. The least group that responses in the survey are group 41 years old and over which is eight percent. This is due to young generation are more frequency travel either for company purpose or travelling.
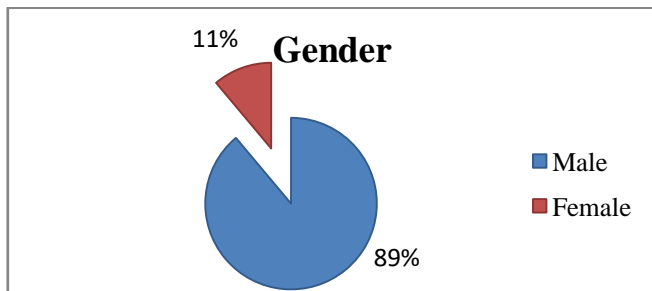

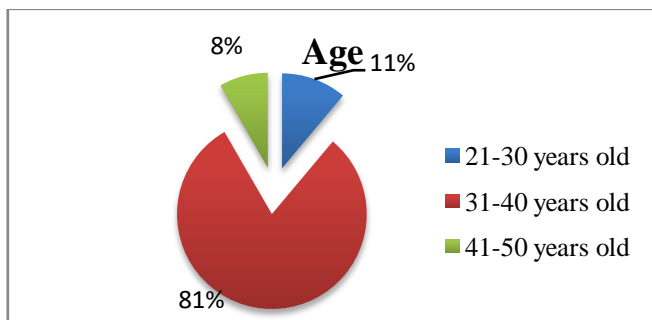**Figure 1: Percentage of respondent's gender**

Figure 2: Percentage of respondent's age

The respondents were also requested to indicate the problems they faced during airport security checking at the Dubai Airport. As shown in Figure 3, most of the respondents reported that security checking at the Dubai Airport is hard to use and understand the requirement needed by their security checking. Besides, most of respondent agree and feel that the airport security system it not safe to be used and difficult to trust it to protect the passengers' information. Therefore, the respondents mostly agree that they do not feel secure after going through the security screening. Mostly respondent was agreed that their data is not treated confidentially during security system process. Based on the data collected, it shows that most of respondentsfeel uncomfortable and stressed out to go through the security system. Besides, they are strongly agreed that main problem in security checking is the passenger or respondent long to queue to wait for the process security checking. Based on the Figure 3, the result

shown mostly respondent face problem is the staff in airport is not helpful and courteous during the security screening or any security process. A possible reason why they are having this difficulty is that none of the security system is easily and flexible to be used to improve passenger experience.
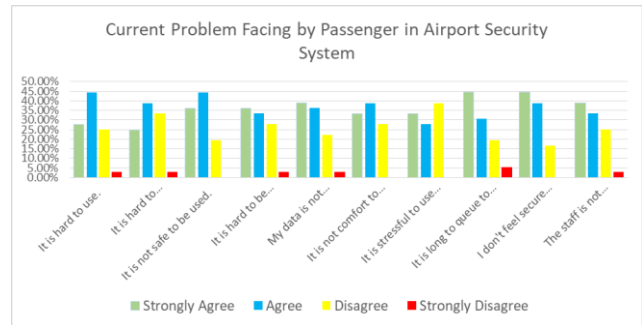

Figure 3: Current Problem in Security System in Dubai Airport

V.   DISCUSSION AND LESSON LEARN

From the result of the survey, we found that the biggest problem faced by the passenger is that they don't feel secure after going through the security screening. The other problems that lead to poor of passenger experience in smart security system airport are =the usage of the integrated smart security system airport. Due to the long waiting lines at the screening points, privacy threat and lack of evaluation on the airport's security system and absence of staffs' assistance have caused in lack of interest on the usage of of airport's smart security system . From this result, we have learnt that it is important to consider the human factor for the airport management to model their security infrastructure. Result also indicates that the airport management can improve their services and facilities to attract and improve passenger experience.

VI.   CONCLUSION

Airports are becoming one of the dominant and preferred transport sectors that intensely improving their services and facilities to attract passengers as well as to improve their travel comfort and experience. With the increasing number of passengers, the security infrastructure of the airport has become the other centre of interest. This is because the security process and services involved in every phases of passenger's travel lifecycle. However, these security process and services often impinge on the passenger experience.

In this paper, a quantitative study that aimed to analyse the current problem face by passenger when using airport security system such as smart gate is presented. From the result, it is discovered that most of the passengers feel insecure after going through the security screening. Other problems faced by the passengers included the difficulty and inflexibility of integrated smart security system airport. The result is quiet alarming as the passenger experience is one of the main indicators for successful airport management. In future work, we intended to replicate the study for bigger number of participants to support the result.

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