

Efficient Passengers Flow Inside The Airports

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Abstract— Airports in the current time facing a big challenge to manage its facilities with the increasing demand for travel and the future travel demand in this study Kuala Lumpur International Airport have been choose as a study area to assess the level of service in the current time and to find the level of the satisfaction with the passengers. In this study the target population were the people who travel from or to KLIA frequently. A questionnaire distributes to the target population to answer certain questions about level of service, degree of satisfaction and to test their tending to use new technology devices to manage the airports efficiently. The data have been collected analyzed by Microsoft excel and the results have been discussed. In the conclusion the results referred that the people did not like to extend the Kuala Lumpur international airport and they encourage to install new technology devices to improve the service and in the recommendations many best experiences of the international airports have been listed.

Keywords— walkalators, self-check in, automated drop baggage, video guide screen.

I. INTRODUCTION

An airport is an operational organization consist of a framework of infrastructure, facilities, equipment, systems and personnel which collectively provide a service to a customer. Rapid growth in airline passenger traffic and, on the other hand, slow expansion of airport capacity, is straining the ability of airports to maintain satisfactory customer service. Many airports are faced with operational efficiency problems. Airports are nowadays struggling with increasing numbers of passengers with strong variations in processing time, shorter transfer connection times, environmental and noise limitation, increased security (baggage screening), pressuring them to become more efficient. Widespread increases in queuing and processing times are well-documented frustration for airports, airlines and passengers (Robert & miroljub 2006)[1]. The travel by plane one of the main means to travel from country to another and one of the safest and most speed transport mean in the world. The airports built in the last century not enough for travel demand and receiving passengers at this time. In compare with the last century the travel cost by planes start to decrease especially for low cost-carriers.

Active – Transport (AT) walking had been a subject of interest in many research studies over the past decades. In recent years, many countries have encouraged walking and cycling because active travel increases daily physical activity and may help protect against obesity and other chronic

diseases. When we look at improving pavements, crossings and pedestrian access to public transport we need to bear in mind the full range of people who will use them. Increasing the number of people on the streets has it benefits too by making public spaces seem more welcoming and providing an opportunity for social interaction and enjoyment of the outdoor environment. Creating an attractive environment is important both in encouraging people to walk and as part of the drive to improve the general urban environment. Consultation exercises regularly reveal the importance of relatively small scale issues: litter, dog mess, obstructions, too much street furniture and a lack of legible sign posts.

The International Air Transport Association (IATA) announced full-year traffic results for 2013 showing a 5.2% increase in passenger demand compared to 2012. The 2013 performance aligns with the average annual growth rate of the past 30 years. Capacity rose 4.8% and load factor averaged 79.5% up 0.4 percentage points over 2012.

Demand in international markets (5.4%) expanded at a slightly faster rate than domestic travel (4.9%). Strongest overall growth (domestic and international combined) was recorded by carriers in the Middle East (11.4%) followed by Asia-Pacific (7.1%), Latin America (6.3%) and Africa (5.2%). The slowest growth was in the developed markets of North America (2.3%) and Europe (3.8%) (IATA 2013). All of that percentage make the airports management in the challenge to gain passengers satisfaction and to manage the airport facilities in the best way.

II. BACKGROUND TO STUDY

Kuala Lumpur International Airport (KLIA) is Malaysia's main international airport and one of the major airports of South East Asia. Built in Sepang district of Selangor, it is located approximately 45 kilometers (28 mi) from Kuala Lumpur city center and serves the Greater Klang Valley conurbation.

The airport has the capacity to handle 70 million passengers and 1.2 million tons of cargo a year. As of 2013, the airport handled 47,498,157 passengers and was Asia's fastest growing airport recording a 19.1% growth year-on-year (air traffic report). It was ranked the 11thbusiest airport in the world by international passenger traffic, and is the 10th busiest international airport in Asia. It was ranked the 28th busiest airport by cargo traffic in 2013 (Airports Council International, 2014).

III. SCOPE OF THE STUDY

This paper addresses "Efficient Passengers Flow inside the Airports " the number of passengers increases day after day, that makes old airports insufficient for travel demand and receiving travelers. Some of the airports built on a big area to meet population growth and future demands, but big areas have a lot of disadvantages one of them the passengers lost between the terminals and gates, especially when they use the national carrier of the airport or variance carriers to make connection for their journey.

The main objective of this study can be surmised as:

- 1-Improve passenger flow inside the airports
- 2-Redesign or rearrange the procedure of check in, security, immigration and boarding
- 3-Increase the number of counters to receive more passengers
- 4-Using the new technology methods to help the passengers handling the procedure inside the airport from the main entrance to the boarding gate.

IV. LITERATURE REVIEW

(Popovic et al. 2010)reported about when satisfactory interaction is not achieved, there can be significant failures, such as occurred with Terminal 5 at Heathrow. For example, in the first five days of Terminal 5 opening almost 300 flights were cancelled, and a combination of factors has been blamed. These 'initial teething problems' included: unclear road signs outside the terminal, wrong directions given inside, lack of parking, problems with baggage conveyors, and slow processing of staff through security screening. This lead to huge queues, baggage delays, bad publicity for the new terminal, and an extremely stressful passenger experience. Bluetooth is another technology that is said to enable a greater passenger focus. In order to apply these technologies to facilitate the needs of airport users (passengers and personnel), it is necessary to understand what airport users currently do and how they interact while they are at an airport. Passenger activities in an airport can be divided into two categories (Kraal, B., Popovic, V., and Kirk, P. 2009) and Processing activities are those directly related to conforming to the legal and regulatory requirements for boarding a plane. These activities include: checking in, filling out any required departure paperwork, negotiating various security and identity checkpoints and boarding the plane at the gate. Only a small proportion of passenger time in an airport is spent on processing activities, including time spent while waiting to be processed. Activities outside of processing activities are identified as discretionary [2].

A larger project that investigates airports as complex systems, including various aspects of passenger experiences and interactions at an airport (for example, information provision, services, processes, equipment and technology). Its overall goal is to construct qualitative models of the experiences, activities and interactions that passengers undergo in an airport. These models will then be connected

within an airport process model and complex system to provide a predictive capacity that will inform the design, or redesign, of better airports for passengers. The International Brisbane Airport passenger terminal has been a living laboratory for the field studies conducted [3].

Technological tools have been developed to help airports achieve their vision. Taking advantage of geolocation and smartphone proliferation, airports can maximize profits. By achieving operational efficiencies, airports will be able to compete globally and reach new performance targets set by their peers related to improving the passenger experience and the quality of service offered to airlines. [4].

Airport technology providers, such as Sita, Amor, Arinc, Amadeus and Ultra, have developed solutions that can be implemented in the whole airport area or at specific airport zones, e.g., check-in, security, gates, immigration, and terminals. The main technologies that an airport can invest in are Wi-Fi triangulation, Wi-Fi signature, Bluetooth, NFC (near field communication), and RFID (radio frequency identification). [5].

Smartphones are expected to become the primary digital method that consumers use in order to gather information, purchase, and interact with brands, friends, retailers and other businesses. In an airport environment, approximately 50 percent of the passengers use smartphones, and 10 percent of those smartphone users have their Wi-Fi enabled, while 20 percent have their Bluetooth enabled. Smartphone users increasingly download airport applications as they are actively looking for information about their immediate environment. Several airports, such as Atlanta, Heathrow, Dallas, Frankfurt, Amsterdam, Denver and Dubai, have already designed user-friendly applications that provide free real-time information to the passenger. For example, Dallas and Amsterdam have launched applications that automatically push updates to the user regarding their flight and gate of departure, security waiting times, parking lot availability, concessionaire listings and user ratings. [6].

About the air travel has been experiencing an increase in demand volume worldwide. As the number of passengers increases, the impact on the air transportation system increases. This will affect the level of service perceived by the passengers. Therefore, there is a necessity to develop a model to predict the perceived level of service to help the airport authorities to determine whether there is a need for improvement or not. A previous study was completed in Carleton University to develop a statistical model (based on Linear Regression Analysis) to predict the perceived level of service for baggage handling system in Canadian airports. Several models were developed to predict the perceived level of service for individual airports and for groups of airports classified according to their passenger volumes. The present study is based on the utilization of the artificial neural network technique and its application to the data collected in the

previous study. In addition, the ANN technique is applied on new data collected from Ottawa airport to measure the influence of the events of September 11th on the passenger's perceived level of service. The results of the research showed that significant improvements could be achieved by the proper use of the ANN approach. Also, the results of Ottawa Airport showed that while there was no change in the perceived Level of Service for both cases; before and after September 11th the results showed remarkable change in the attitudes of passenger in the weights assigned to the parameters governing the overall perceived Level of Service of the Baggage Handling System.[7].

Airports with their complex infrastructure represent a central component of today's traffic system and have to satisfy a variety of different tasks. From the passenger point of view, the building is primarily designed for providing handling processes for departure and arrival. These procedures possess different environmental demands, which result from safety/security and legal requirements. From the airport point of view, safety and security of the processes are a major issue, whereas the passenger expects adequate service and comfort levels. On the other hand, airport revenues are increasingly dependent on the non-aviation sector (retail and service revenues). The airline focuses on adequate terminal infrastructure and competitive product supply. To ensure an optimal combination of these frequently conflicting requirements, the airport operator has to balance all customer demands. Recent years have shown that, in particular, legal changes, growing security constraints and delays significantly consume system capacity.[8].

V. METHODOLOGY

The study was conducted to determine the current situation of the level of service inside KLIA and to assess the level of passengers satisfaction about the service provided inside KLIA and their impression about KLIA and the difficulties they may be face it inside KLIA to move from place to another inside the airport beside the worker treatment with them. A survey will be carried by using the designed questionnaire in many places who contain the people who travel frequently from KLIA airport. The questionnaire designed include the passengers airports experience and the level of satisfaction of the passengers. In this study two kinds of questionnaire distribution, the first method is the conventional one by face to face with target population by questionnaire papers and the second the method is the electronic questionnaire by distribute papers include the QR code by scan it with scanner applications an online link will appear with the questionnaire this this type of questionnaire created with a simple form for the people who don't have the time to respond the questionnaire and to the people who have an experience with the travel to or from KLIA and hard to reach them. Selection of the study area depend on where can we find the target population who have the experience in travel and who can evaluate and their suggestions might be useful. Three places have been chosen to implement the

questionnaire there the first type of places are universities libraries (UKM library, UPM library and LIMKOKWING library). The second type if places is the tourism attraction (KLCC garden, Suria mall and pavilion mall) the last type of the places is the stations which is the start point of airport journey (KUALA LUMPUR central station – KLIA express station)

VI. DATA ANALYSIS AND RESULTS

The result illustrate that the percentage of male bigger than female of passengers who travel from or to KLIA with percentage (61.3%) for male, (38.7%) for female .higher percentage for the age category between 21-30 years old.(59.3%) of the responders are complete their university study. (43.3%) for student occupation and the (36%) for employed for wages. The highest percentage for the participants from Asia with (40.7%), (26%) for the responders from Middle East, (14%) for the responders from Europe and the rest from other continentals. Responders the highest percentage is (33.3%) for the responders who traveled twice per year. The percentages of the international trip (85.3%) and domestic trips (14.7%) that mean the most of KLIA trips are international. The most percentage for the direct flight (53.3%) and the second one is transit with the same airline (44.7%). the high percentage for the tourism visitors (42.7%) due to the tourism attraction of Malaysia, (36.7%) for study purpose, (18.7%) for work purpose and the last percentage for other purposes (2%).(34.7%) from the responders used the train and (32.7%) from the responders used the private car or someone took them to the airport beside (29.3%) from the responders used the taxi to go to the airport. the majority of the responders (32.7%)are answered they went to the airport before 3 hours before the flight time. (24%) of the responders are going to the airport before the two and half hours before departure time.(23.3%) of the responders going to the airport before two hours from the departure time.(90.7%) of the responders are used the signboards inside the airport.(91.3%) of the responders are used the walkalators inside the airport.

The responders when they have been asked if they have enough time are they going to a restaurant or café or they going to wait near the boarding gate. The majority of the responders answered they will go for shopping or to a café or a restaurant after they check the boarding gate location with a percentage of (60%). The other percentage is 24% of the responders answered that they going to wait near the boarding gate and 16% of the responders are going to shopping or restaurant before they check the boarding gate location. The responders after they have asked if they think that KLIA structure helpful for the transit passengers or not. The majority of the responders 93.3% are answered yes it's helpful

78% percentage of the responders who found that KLIA is big enough and not need more space or make it bigger and 22% of the responders answered yes need more space. . The majority of the responders 76.7% of the responders are encourage installing video guide screen and 23.3% of the

responders are discourage installing video guide screens and they found the signboards are useful. The majority of the respondents 59.3% encourage the self-check in and automated drop baggage check in machine and they found it will be faster and easier, 25.3% of responders don't know how to use it and 15.3% of the responders are not trust these machine.

The highest percentage for the category from 21-30 years old with 35.3% for international trips and 6.1% for domestic trips. The category of age from 31-40 years old 24.5% of them travel international trips and 4.2% of them travel domestic trips.

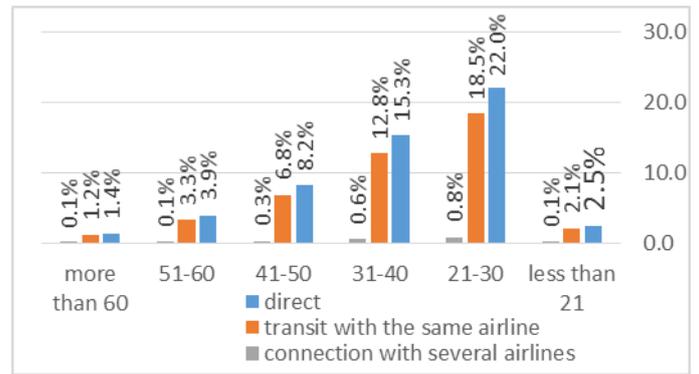


Figure 2 type of flight and age categories

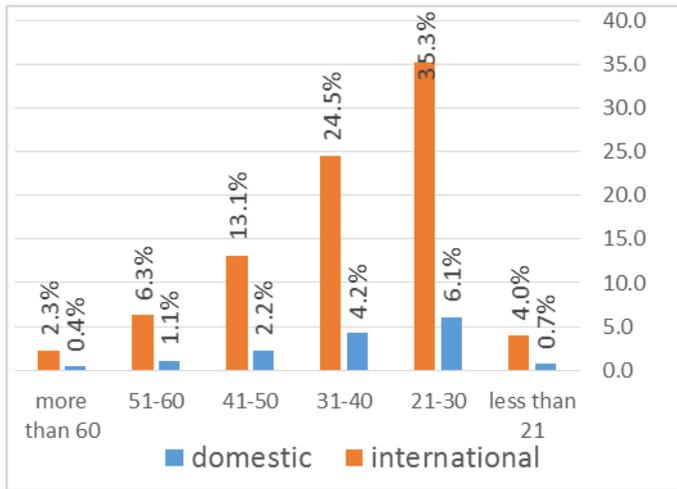


Figure 1 domestic/international flights and age categories

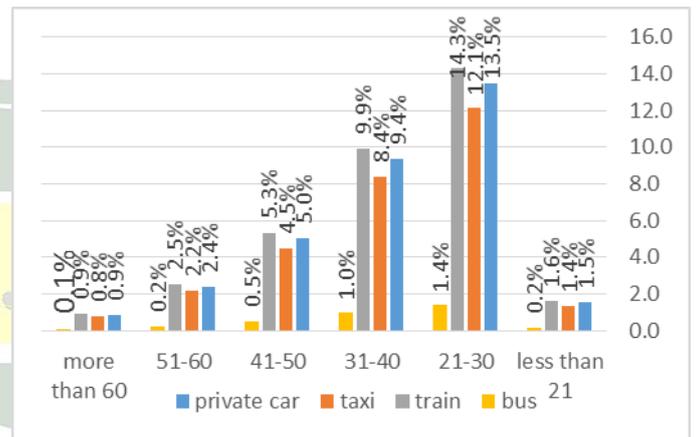


Figure 3 mode of ground transport and the age categories

The most preferred flights from the passengers is the direct flights 53.3% of the responders using direct flights. 22% of responders are from 21-30 years old, 15.3% of them are from 31-40 years old. , 8.2% of them are from 41-50% years old. 3.9% of them are from 51-60 years old and 1.4 of them are more than 60 years old. The second preferred flights are transit on the same airline because it have some features like auto luggage transfer and ready boarding card for the next flight with the knowledge of the boarding gate number. 44.7% of the responders their flights are transit with the same airline, 2.1% of the responders are below 21 years old and their flights are transit with the same airline, 18.5% of the responders are from 21-30years old and their flights are transit with the same airline, 12.8% of the responders are from 31-40 years old and their flights are transit with the same airline, 6.8% of the responders are from 41-50% and their flights are transit with the same airline, 3.3% of the responders are from 51-60 years old and they bought tickets with a transit with the same airline and the last age category of age is more than 60 years old

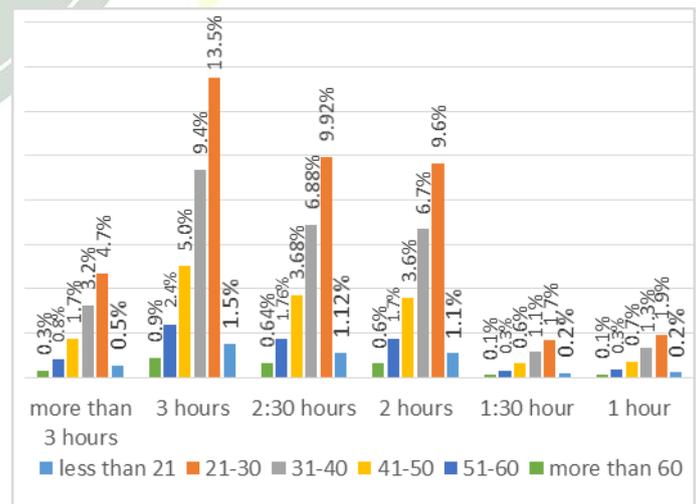


Figure 4 age categories and before how many hours the responders go to the airport?

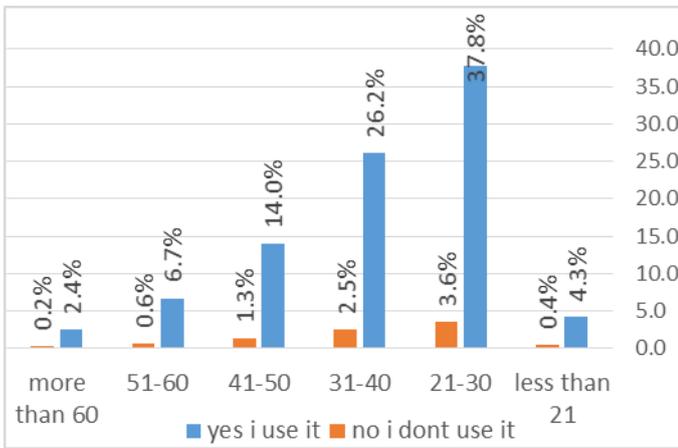


Figure 5 walkalators usage and age categories

A question have been asked for the participants who answered the questionnaire about if they have enough time are they going to shopping or café? And are they going to check their boarding gate location first or later? the majority of the responders (60%) answered yes they going to go to shopping or to café if they have enough time but after checking the boarding gate location first 2.8% are below 21years old, 24.8% are between 21-30 years old, 17.2% are between 31-40 years old, 9.2% are between 41-50 years old, 4.4% are between 51-60 years old and 1.6% are above 60 years old.

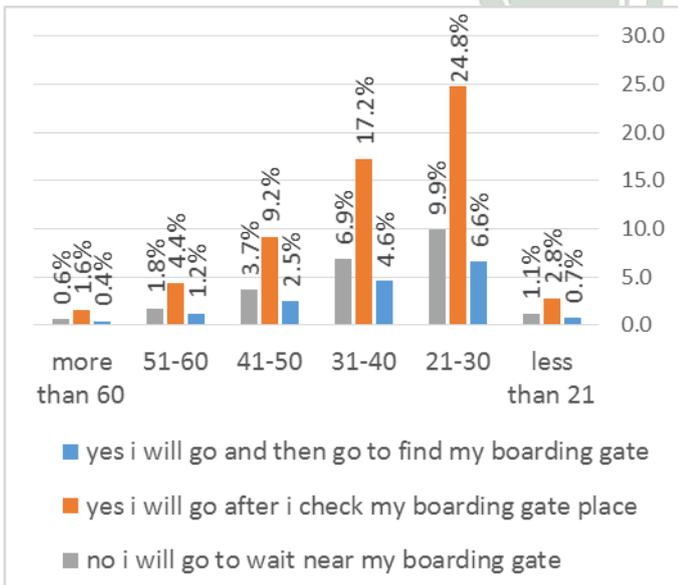


Figure 6 passengers behavior and the age categories

The responders who participate in the survey have asked about is the KLIA structure helpful for transit passengers or not? the majority of the responders are answered yes it's helpful with percentage 93.3%, due to the unique design of the

satellite terminal and its shape like cross section make the movement for the transit passengers easier because all the corridors are join in one center and there is an information helpdesk in that center with a good collection of retail shops and cafes that's make satellite terminal more helpful than a lot of other airports.

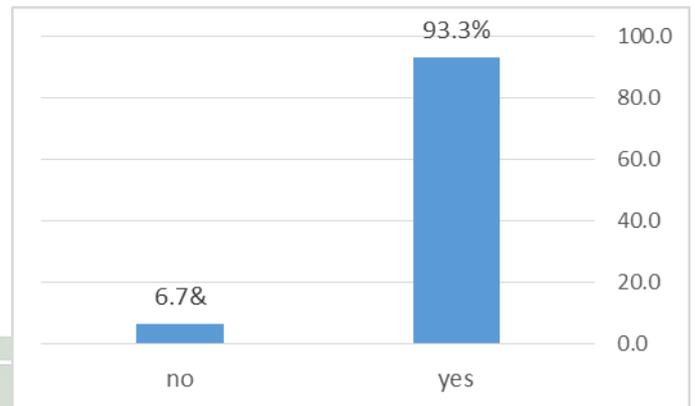


Figure 7 is KLIA structure helpful for transit passengers?

In one of the survey questions the respondents have asked if they encourage to extend KLIA to bigger. the majority of the responders answered no its enough with a percentage 78%, the airport in the view of responder it is enough but it's of course not enough for the future demand and increasing population so the administer of the airport should find the solution fulfil the future demand and don't make the passengers feel tired to move from place to another.

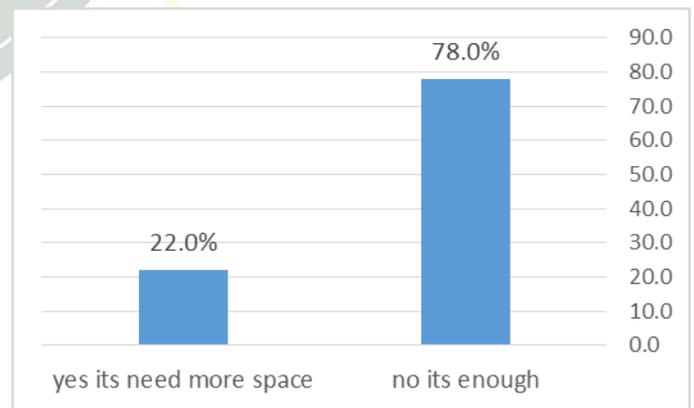


Figure 8 is the KLIA space enough or need to extend to bigger?

The responders have been asked about if they encourage to install video guide screen instead of signboards, the majority of the responders answered yes it will be easier (76.7%) that means the passengers intend to interact with the new technology devices and creative ideas could make the movement from place to another easier and interesting.

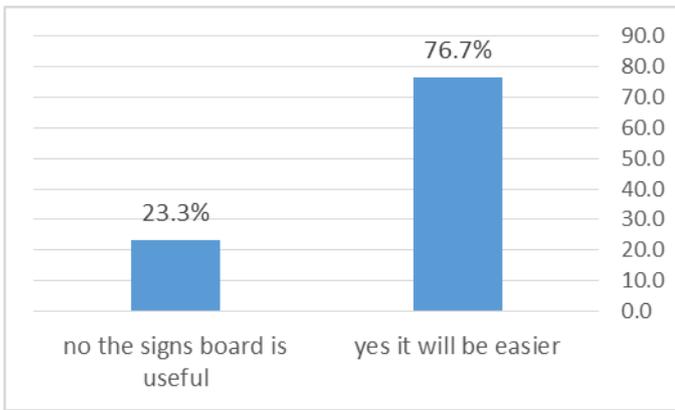


Figure 9 encouraging to install video guide screen

A question have asked to the responders who participate in the survey if they are encourage to install self-check-in and luggage check in machines instead of the traditions counters? The majority of the responders answered yes it will be faster and easier (59.3%) and (25.3%) of the responders answered they don't know how to use it that represent approximately the quarter of the sample size and the rest of them (15.3%) are answered they don't trust it.

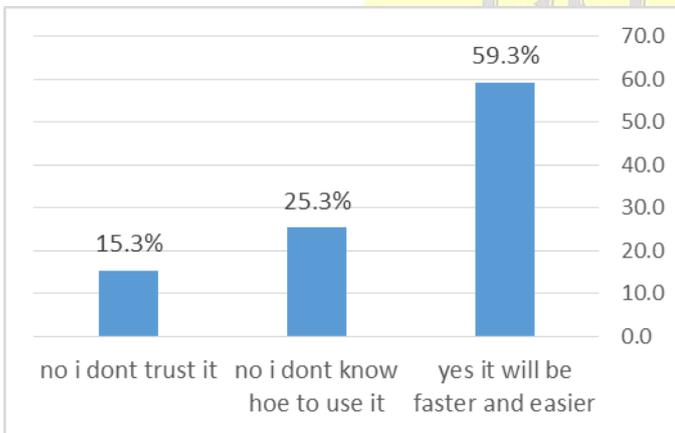


Figure 10 encouraging to install self-check in and automated drop baggage check in machines.

VII. CONCLUSION

The analysis of the result shows the high percentage of the international flights from KLIA in comparison with the domestic flights 85.3% that's mean KLIA depend on the international flights.

The survey showed that the majority of the passengers are travel on direct flights (53.3%), sometimes they choose lower quality airline just because of the direct flights and when we asked them about the reason about that they were many reasons in their answers one of them it was to afford the effort of changing gates and there is a probability of lost in the transit airport or miss the flight and it was their second choice to travel with a transit in the same airline and the cause

beyond that is the auto transfer of the luggage from the airline company and they just have to change the Gates to reach to their destination flight. The last choice of the responders was the connection with several airlines that's because they have collect their luggage and check in again with the next flight airline company beside the long time need for the travel schedule as a new flight.

The analysis of the results showed that the most of the passengers who travel from or to Malaysia for tourism purpose 42.7% that's mean a good cooperation between the airport administration and the ministry of tourism to attract the tourists and guide them to the tourism sites around Malaysia, the second percentage was for study purpose for the students who study inside Malaysia or outside Malaysia and 18.7% of the responders are travel for work purpose.

The questionnaire analysis showed the percentage of the people who travel many time from KLIA (61.3%) and they are familiar with the KLIA structure and facilities and when we asked the responders about the mode of ground transport they have been used to go to the airport or to leave the airport it were 34.7% of the responders used the train and 32.7% are used the private car and 29.3% are used taxi to reach the airport. We noticed that the highest rate among the percentages is for the passengers who used the train.

The responsibility feeling of the passengers has been examined by asking them about how many hours before their flight and majority of the passengers are going to the airport before 3 hours and more than 3 hours.to ensure that they will travel, and that good indicators for the passengers experience

By asking the passengers about their experience in the travel and airports one of our questions was about the signboards and the analysis of our questionnaire showed the majority of the responders 90.7% are followed the signboards and about if they need help are they going to ask the information help desk also the majority of the responders 80.7% are going to ask the information help desk.

The free duty shops and the restaurants are tempt the passengers and they lost time inside it then they miss their flight because they don't know their boarding gate location or waste the time in shopping, our questionnaire asked the passengers in case they have enough time before their boarding gate opening what they are going to do, the majority of the responders 60% are answered they going to check their boarding gate location and then going for shopping or to a café, and a good portion of people 24% are going to waiting near their boarding gate. These percentages showing the responsibility of the passengers to not miss their flights and that good indicator to improve the service because that responsible feeling encourage to improving the service.

The responders have been asked about KLIA structure and if they found it helpful for the transit passengers and the

majority of the responders 93.3% answered yes it's helpful for the passengers who have transit on Malaysia airlines and the cause beyond that to the unique design of the satellite terminal and its cross section shape give it the feature.

When the responders have been asked about extending of KLIA to bigger 78.8% of them answered no its enough but with the population growth and future demand for travel its need to growth and when they have been asked about installing a new technology guider it's a video screen show the passengers their way to their gate . about the self-check-in computers and self-luggage check in the majority of the passengers 59.3% are encourage to install it and the rest of the responders answered no because they don't know how to use it or they don't trust it.

Selling tickets more than plane capacity to avoid the empty seats on the flight may make problems when all the passengers came for they flight and the and not all of them can travel of that flight because of the capacity of the plane, that's make a problem with the passengers and make them waiting in the airport for a next flight to travel and that's one of the congestions causes.

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