

Comparative Study of Landside Facilities in Airports

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Abstract—Our paper deals with introduction to landside management and a comparison study between three airports in terms of their landside facilities like check-in, terminals, public transportation, access roads and baggage handling. The final result of this particular comparison study tells us that for each category which airport provides the best service and also in overall which is the best, worst and average airport among these three present.

Keywords—Landside facilities, Terminal, Transportation, Parking space, Baggage, Comparison

I. INTRODUCTION

Landside is one of the most important aspect that is required while managing an airport. Landside includes the terminal buildings, parking facility, all the duty-free shops and the baggage deposit and claim. In order to have a well-maintained airport, they need to be able to provide the best of these categories, which includes parameters such as the time taken to process through the terminal, including the check-in, baggage deposit and the immigration if it exists. While doing so, they should also provide indefinite comfort to the passenger and necessary amenities such as water, washrooms and clean up facility.

In order to provide the best experience, different airports employ different methods, starting with the design of the airport terminal building, such pier satellite, pier finger, transporter, semi-circle, based on the design, each of them has their own advantages and disadvantages. Based on these designs, the facility provided to the passengers vary, while having their own boons and bane, a landside facility should proceed to provide comfort to the passenger. Other than the check-in process mentioned earlier, the terminal or landside is also a window to the outside world, providing as a tourist attraction point, therefore a landside facility should also provide ambiance, cleanliness, rare architecture, duty-free facility, entertainment hub, customer service and so on. If and only if an airport is able to provide such facilities will we able to call it a good landside facility.

So in order to study the landside of airports we have chosen the same conditions and facilities we have mentioned above. These parameters will help us analyse the quality of an airport and where it stands and therefore we can come up with a resultant model of an airport with the do's and don'ts.

We have chosen three airports from best category, moderate category and worst category. The Respective three airports are:

- Incheon International Airport (South Korea)
- Barcelona-El Prat Airport (Spain)
- London Luton Airport (United Kingdom)

A. South Korea's Incheon International Airport

In the region of South Korea, this airport is often referred to as the humongous one present in that particular region. It is located in Seoul Area and has been considered one among the massive and highly engaged airports present in Earth. During the past 11 years (i.e.) from 2005 to 2016, this airport has always been receiving best airport award from the respective council. Passenger capacity of this airport is in the range of 25-40 million. Total number of terminals present is 2 and number of boarding gates is 111. Total number of check in counters present is 270. Total number of passengers travelled through this airport in the year 2017 is 62,082,032. Incheon airport provides large number of services like casino, indoor gardens, private sleeping rooms, spa, ice skating rink, golf course and a Korean culture based Museum. Generally, the time taken for an average departure and arrival in an airport is 60 minutes and 45 minutes respectively, but in Incheon airport time taken is 19 minutes and 12 minutes for departure and arrival. Therefore, it has been ranked as the rapid airport in customs category across the world. It also has received high ratings by Business Traveller for 3 consecutive years starting from 2013, as the best duty-free shopping mall. This airport holds a record of 0.0001% baggage mishandling rate.

Largest terminal present in South Korea area is Terminal 1 of Incheon airport. Dimensions of terminal 1 is 1060 metres length, 149 metres width and 33 metres height. Price for building this terminal comes out to be 1.386 trillion South Korean Won. Terminal 1 consists of 44 boarding gates, 50 customs inspection ports, 2 biological quarantine counters, 6 stationary and 14 portable passenger quarantine counters, 8 arrival security ports, 28 departure security ports, 120 departure passport inspection counters and 252 check-in counters. People travelling through Asiana Airlines, Korean Air and China southern airlines have the privilege to access the automatic check-in counter lane, which was introduced in 2015. With the help of this machine, travellers can give input about their flight details, scan passports and receive flight

tickets, finally loading luggage onto the conveyor belt. During May 2015, Incheon airport smartly used their counter island to bring unmanned luggage handling system into existence. On May 31, 2008 passenger concourse came into existence. Concourse and Terminal 1 are linked by 2 parallel underground passageways of 870 metres length with the help

of IAT. Concourse consists of 6 Lounges and 30 Gates. Opening of Terminal 2 was on 18th January 2018. Certain Airlines are shifted from terminal 1 to terminal 2 and their respective names are Delta Airlines, KLM, Korean Air and Air France. Terminal 2 will soon serve other airlines like China Eastern Airlines.



Fig. 1 Aerial view of Incheon International Airport in Jung-gu, Incheon, South Korea

Buses generally used in the airport are called limousine buses. These buses which are of prescribed standards travel only to Gimpo Airport and Songjeong Station. There is another type of bus called Intercity Bus which connects other towns and cities in Korea. In Gangnam, Limousine buses are generally used to connect Incheon airport with air terminal present in city. This Incheon airport has a railroad airport station containing express trains, which is situated at Transport Centre, which in turn is present near to main terminal building. This service is provided only for capital city's airport and Gimpo airport. In Seoul station city airport check-

in, customs & immigration services are available even before you enter the arrival area. Trains like railroad express and other express trains in Korea operate across similar stations, but they use different platforms to achieve this feat. Above mentioned trains frequency is 20 per day from this huge airport named Incheon. This 20 per day is split into (12+2+4+2) 12 times represents the gyeonbu line, 2 times represents the gyeonjeon line, 4 times represents the honam line and final 2 times represents the jeolla line. Incheon Airport's train transportation system named maglev's inauguration was on February 2016.

First phase is of 6100 metres length, it is distributed over 6 stations, picking riders from airport towards Water Park which is situated at south-west of island. Phase 2 is 9700 metres length, expanding line till island's north-west region. Phase 3 is 37400 metres length, which completely converts the line to circle. The link between yeongjong-do to mainland is accomplished by ferry servicing. But, still distance between dock and airport is short. We should always find a particular alternate way to reach the airport after arriving in the island.

This airport has a good benefit of short time period parking lot for nearly 4000 cars and long time period parking lot is around 6000 cars. Shuttle facilities are essential because they generally link long time period parking lot to the passenger terminal and cargo terminal. Car rental is situated nearby long time period parking lot. Toll Yeongjong Bridge and expressway are responsible for connection to mainland. Additional expressway on Incheon Bridge is to link the island with Central Incheon.



Fig. 2 Inside the Incheon Airport

B. Barcelona-El prat airport



Fig. 3 Terminal 1 interior of El-prat Airport in Barcelona, Spain

Barcelona-El Prat is an important global airport, which is present at middle of Barcelona. It is the second largest and busiest airport in Spain. While in Europe, it is the seventh busiest airport. This airport has a record of holding 44.1 million passengers in the year 2016, showing an increase of 11.2% from the year 2015. Total number of terminals present is 2 and number of boarding gates is 64. Here Terminal 2 is split into 2A, 2B and 2C. Main purpose of this airport is to serve domestic European destinations. Total number of check in counters present is 258. Total number of passengers travelled through this airport in the year 2017 is 47,284,500.

Opening of terminal 1 was on June 16, 2009 and this terminal is considered to be the 5th largest in the world. Total area of this terminal is around 548000 square metres, 600000 square

metres of aircraft ramp area, 13000 parking lots and 45-60 fingers. This terminal has the capacity to hold huge aircrafts like Boeing 747 and Airbus A380. Schengen and Non-Schengen flights are also taken care by this terminal. Terminal 1 consists of 60 jetways, 258 check-in counters, 12000 parking spaces and 15 baggage carousels. Terminal 2 has an additional 12000 parking spaces. Before constructing this terminal they claimed that it can manage 30 million passengers but after construction they are able to manage 55 million passengers annually, which means per hour 90 operations are taking place. With help of some additional satellite terminal, we shall increase the passenger capacity to a maximum of 70 million. Terminal 2 is split into 2A, 2B and 2C. On 1968, Terminal 2B was opened. In order to extend airport capacity other two terminals 2A and 2C were opened in 1992. Majority of the

airlines present in this terminal are low cost airlines. After opening of Terminal 1, Terminal 2 struggled so much to get importance and they got some consideration only after reducing landing costs. This action made low cost and regional carriers to land in this terminal. It was impossible for terminal 2 to reach maximum capacity and terminal 2A remains unutilized for departures. EasyJet and EasyJet Switzerland flights are operated by Terminal 2C. Module M0 operates flights to United Kingdom and Module M1 operates flights to rest of Europe. Low cost airlines like Ryanair, etc. are mostly operated by terminal 2B. Boeing 777 is used by Terminal 2A. Module U: Schengen destinations, Module W: Non-Schengen destinations & Module Y: Non-Schengen destinations.

On line R2 Rodalies railway station is present and it is self-owned by Terminal 2. This train starting point is from Macanet-Massanes station and frequency of this train is once in half an hour, has important drop points belonging to Barcelona metro system which includes Clot station, Sants railway station and centrally present Passage to Gracia railway station. For passengers who are present in Terminal 1, definitely have a linking bus from Terminal 2B to Terminal 1.

Since important expansion is taking place currently, a brand new shuttle train will be manufactured and linked from Terminal 1 to Sants station and Passage to Gracia station, train service will begin by end of 2020. On February 12th 2016, a link called line 9 was established by means of metro in underground to connect Airport and Barcelona. Beneath airport terminal T1 lies terminal 1's own station and airport rail station at terminal T2 is very close to the airport station T2. This Line 9 is used to give link between city centre and metro lines. Certain highways like C-32B links the Ronda de Dalt beltway present in Barcelona and important motorways through airport to main traffic interchange. This airport also has car parking facility, totally 24000 parking spaces are available. There is a public bus named Transports Metropolitans de Barcelona (TMB), line 46 of this bus starts from Parallel Avenue. Speciality of Aero bus is it provides direct transmission from terminal 1 and terminal 2 to the city centre located at Place Catalonia. Several routes are there from Barcelona airports to closest airports like Reus Airport or Girona–Costa Brava, provincial and national capitals and also links with France or Andorra, these are provided by additional bus company.



Fig. 4 View of Terminal 1 from the tarma

C. London Luton Airport



Fig. 5 Check-in building of Luton Airport, London, United Kingdom

This is an International airport and is located at Bedfordshire, United Kingdom. This airport holds a record in its passenger movement value which is 14.6 million in 2016. Across United Kingdom, this airport is said to be the fifth most occupied one. Also considered as the fourth largest airport in the London area. Total number of terminals present is 1 and number of boarding gates is 28. Base for several airlines like EasyJet, TUI Airways, etc. are present in this airport. Total number of check in counters present is 62. Total number of passengers travelled through this airport in the year 2017 is 15,799,219. It is a single passenger terminal building consisting of two floors, which in the past has been reshuffled and extended many a times. Ground floor has facilities of shops, service counters, Main Hall with 62 check-in counters, segregated security screening hall and arrival facilities. In upper floors we shall find various restaurants, stores, departure lounges and 28 departure gates in both sides of the piers. Only 1 airport lounge is situated inside the terminal other than branches of Starbucks, Burger King and Boots.

This airport is close to M1 motorway and this M1 has a link to the M25 motorway. Also short term car parking available in airport which is present adjacent to terminal, medium term car parking in airport which is present at west of terminal and long term car parking in airport which is present at terminal's eastern region and shuttle buses are being linked to terminal. Various independent operators provide a Pre-booked off

airport parking facility. Main purpose of parkway is to serve the airport, so its construction was completed during 1999. This parkway is situated on the Midland Main Line. Time taken for travel between parkway and London St Pancras station is 22 minutes only when we travel by east midlands train. Major operator named Thameslink has its services running from station to Bedford, St Albans, London, Wimbledon, Sutton, Gatwick Airport and Brighton. East Midlands Trains (EMT) offer semi-fast services, which includes contacting Parkway station once in an hour. Travel to London St Pancras, Bedford, Wellingborough, Kettering, Corby, Market Harborough, Leicester, Loughborough, Beeston and Nottingham is covered by EMT and other trains. Shuttle bus service establishes a link between railway station and airport, distance between them is just above a mile. For ticket holders rail fare is already added in the air ticket, but for non-ticket holders cash fee is charged for rail travel. To replace shuttle bus with rail links, many schemes were proposed in the past. In 2007, a new proposal was introduced to replace shuttle buses with a segregated tracked transit system. Certain ambitious plans were implemented only during 2015. Plan was to construct a new direct railway link from the Midland Mainline to the airport, with the key purpose of reducing journey time from Central London to the airport to a minimal 20 minutes and thereby significantly increasing passenger numbers. Another

plan was proposed in 2016 by airport owners to build a 2300 metres light rail link from the Parkway station to the airport at a whopping price of £200 million. The planning application was submitted in September 2016 and finally got accepted in June 2017. By end of 2020, link will come into existence for passengers.

The airport operators received great help from the CBI, EasyJet, the Federation of Small Businesses (FSB), etc. for their respective struggle for better rail links to airport parkway in the year 2016. Operators generally call the government to make a compulsory requirement for the new East Midlands franchise holder to launch four fast trains per hour from Central London. Department of Transport is currently doing some negotiations to extend the London Oyster card contact less ticketing system's validity to Airport Parkway. Future plans is that Oyster will be valid only for travel through Thameslink services to the airport by 2018. This airport and town centre present in Luton are connected by local buses, they also cover some nearby places. Airport is provided with the Route A of the Luton to Dunstable Busway, this is a faster bus route which links the airport with Town Centre present in Luton and the nearby towns of Dunstable, Houghton Regis and Milton Keynes. Arriva Shires & Essex usually operate bus, which travel on a separate and guided bus pathway across Luton. Normal bus services also operate across north London and its main purpose is to link airport with towns and cities, including those 100 buses operated by

Arriva, which offers an once in an hour connection to the nearby towns, Metro line 84A buses service and Courtney Buses coach service to Bracknell. To include the 757 operated by Green Line Coaches, coach services are provided directly to London & also the A1 operated by National Express always provide competing services to and from Victoria Coach Station. Purpose of Easy Bus services is to operate towards Liverpool Street station. National Express services having long range usually tend to start linking Stansted, Heathrow and Gatwick Airports as well as destinations in the Midlands and North of England. Railway's major link named Go via Thames link is providing a shuttle bus link between the airport and railway station present in Airport Parkway. This service runs 24 hours a day with frequency of every 10 minutes between 12am to 5am and from 5am to 12am, it is destined and timed to meet each overnight train service. Totally 3 services regarding parking is available around the airport, governed by Parking authorities and they offer 24 hours support along the terminal and Mid Term parking, Long term parking, and Staff Car parking facility, some rental companies and hiring centres are a partner of Parking authorities named APCOA. Brand new bunch of 6 Mercedes buses were purchased for these kind of operations during 2014. Variety of other bus services operated by off-site parking companies also tends to assist the airport, which includes Airparks, Paige Airport Parking, Centre bus and Coach Hire 4 U. Final two operators provide staff shuttle buses in the interests of TUI and EasyJet.



Fig. 6 Waiting Area of Luton Airport, London, United Kingdom

II. CONCLUSIONS

Finally, what we can infer from these 3 airports is that passenger capacity and passenger movements in the year 2017 is higher in Incheon airport, least in Luton airport and El prat airport lies in between these two airports. Again number of facilities in terminals is more for Incheon airport, moderate facilities in El prat airport and comparatively lesser facilities present in Luton airport. Public transportation and access roads facility is high for Luton airport, moderate facility for Incheon airport and lower facility for El prat airport. Parking lots and parking spaces available is higher in El prat airport, moderate in Luton airport and lower in Incheon airport. As an aerospace engineer, my suggestion would be to construct an additional satellite terminal which could eventually increase the passenger capacity of that particular airport. Semi-circular terminal present in Incheon airport is an added advantage for it, as travel time between check-in and boarding the aircraft is considerably reduced. If landside area is located in city, it enables people to travel only through public transportation to reach the landside of airport. Also, this would be useful for people who don't have their own means of transport. In addition to this, people who don't wish to travel through public transportation shall always travel through taxi or shuttle to reach landside present in city. This taxi or shuttle transport cost is comparatively much lesser than usual taxi service available in the city. A particular passenger has to

undergo several processes before entering and after leaving the flight and we usually feel that this consumes more amount of time. In order to save this time, it is good to construct a high speed train between landside and airside. So, all these processes like passenger screening, baggage screening, baggage claim, baggage sorting, passport control and customs will take place in train and passenger won't feel that they are waiting for a long time. But still they would be constantly travelling in train and also majority of time would be saved.

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