Analysis of Airport Operations

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***Abstract*—This paper explains about the various operations of an airport. Airports are now transforming into business hubs rather than only its main function. Also, the traffic has increased due to large number of passengers opting for airways, so the services provided and the quality of airport must be maintained at high standards. For good service there must be a good management which takes good care of the operations of the airport. A hit on one operation has its effects on the other functions as well. Important sectors of airport duties and operations have been explained in this paper. There might be few things unmentioned in this paper but their contribution is required as well.**

I. INTRODUCTION

Early airports had only very basic functions, designed at meeting the simple needs of early flyers. As transportation evolved, airports became more complex entities – linking communities together through an inter modal system.

Airports provide facilities and services to many organisations involved in air transportation. These agencies play different roles. In addition to direct customers, airports need to deal with a number of external partners, who in spite of their remoteness play an important role in the success of an airport.

To understand an airport better let us define it:

Surprisingly enough, there is no official definition of an "Airport". Even the International Civil Aviation Organisation does not define it.

To make a definition of our own, we shall start from the obvious and work up towards a complete definition of an airport. As we can think only about the operations of an aircraft while making a definition, we should always remember that the landside aspect of airports is as important as its airside.

If you have ever used an airport, either as a passenger or a visitor, most likely you would have arrived at the airport by some kind of surface transportation such as a car, taxi, bus or maybe a train. As an arriving passenger, the process would be reversed as you would arrive by air and then leave the airport by surface transportation.

From the above statement, we can formulate a definition such as: An airport is a facility where exchange takes place between land transportation and the air mode of transportation. This definition introduces inter-modal processing but does not talk about a situation where you would arrive by air and depart by air without exiting the airport. However, in a given airport the number of connecting passengers represent only a small percentage compared to the total traffic.

Now that we have defined an airport as a common man, let us expand our survey of the word airport. Marketing people would view an airport as a commercial enterprise whose mission is to provide passengers and merchants with facilities and services that meet their requirements. Economists and politicians view it as a business intermediate with important local and regional economic gains. These two definitions introduce the concepts of customer needs & market and external benefits respectively.

All these definitions are valid and they apply to an airport to some extent although the main function of an airport is to provide an interface between the surface mode and air mode of transportation.

II. AIRPORT CLASSIFICATION

The airport is classified into three major areas namely Landside, Terminal and Airside. Let us look into each aspect of an airport in detail.

A. Landside

Almost every air trip starts and ends with a surface mode of transportation. However, not all rides are made by passengers alone, guests come to the airport to meet or greet passengers, employees come to work, and delivery and service vehicles can be numerous. These vehicles require an efficient road network, adequate parking facilities, and a good connection to the outside road network.

Roadway and parking congestion can be a major cause of disruption and delay for the passengers and visitors at airports. The technological advancements to alleviate this problem could be, interdiction of dedicated rail links between the city and the airport, use of intra-airport automated people movers and automated pay equipment in parking lots etc.

The landside facilities can also be used for adding additional revenue to the airports by providing space for advertisements. These advertisements are a benefit to both, the advertising company because their sales improve and to the airport because the company needs to pay a rent for using the airport space for their advertisement.

The landside infrastructure can be made more attractive and advanced so that it motivates the passengers to fly more frequently.

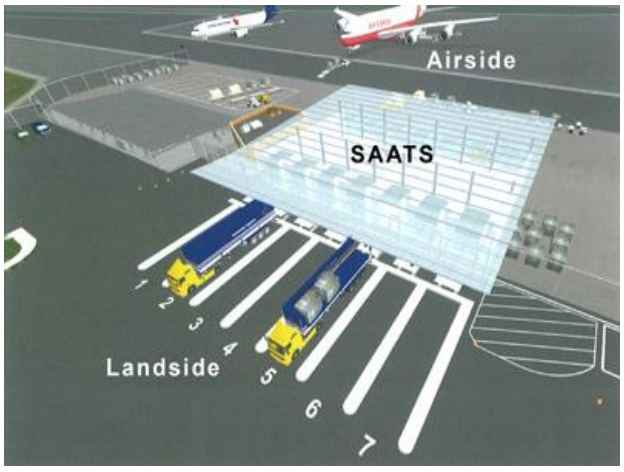
B. Terminal

The terminal building is the place where passengers, luggage and freight change takes place between the land mode and the air mode. The terminal is processing facility for which technological changes have been constant and profound. While the initial terminal buildings were constructed in a way only to protect passengers and employees from the elements, modern terminals are sophisticated infrastructures with almost all amenities.

Most of the improvements are evolved around security, efficiency and comfort. Large terminals often provide moving sidewalks to reduce walking distance. Computerised ticketing and check-in procedures have become common to speed up the process and reduce congestion. Automated baggage sorting equipment expedites baggage processing and reduces the risk of misdirected luggage.

Aviation security did not become an issue until when the first threats against civil aviation were made. Until then airport allowed public access near the aircraft with only minimal pre-boarding control: checking the passengers was unheard of and baggage screening was unnecessary.

As security became more important, airports implemented measures to prevent unlawful interference with aviation. Fencing of airports and restricted access to aircrafts, screening of passengers and baggage were initially a manual operation. Now the screening relies on state-of-the-art technology such as metal detectors, machine-readable passports and biometric recognition equipment etc.



C. Airside

In the earlier days of aviation, aircrafts were light, slow and operated in good meteorological conditions. They could operate out of grassed strips and a small hangar was the only ground facility required. As aircrafts became faster and heavier and as the need for reliability increased, hard surface runways had to be constructed; eventually these runways were equipped with edge lighting to allow flights to operate in reduced visibility conditions also.

As the characteristics of aircrafts increased, longer and wider runways were required with higher pavement strength. But after few years more powerful engines were invented and the runway length gradually decreased and became stabilized.

Air Traffic Control (ATC) was created when the density of air traffic increased, especially on and around airports: there was need for some sort of order to keep flying safe. ATC was established first in the form of Control Towers, with the responsibility to prevent collisions on ground and in the air, near airports, and to provide a smooth flow of traffic. With further advancements, along with ATC came the need for radio communication between pilots and air traffic controllers. To that effect, radio transmitters and receivers were installed at airports and on-board flights.

III. AIRPORT OPERATIONS

Airport operations are those tasks and duties that has be carried out in the above-mentioned areas of an airport. There are several operations few of which are discussed below:

A. Representation of Airlines

This sector mainly involves the administration of an airport. Contact negotiation, supervision, evaluation of contact compliance, inventor management are all a part of airline representation. To some extent it also holds financial responsibility.

Contact negotiation and administration takes care of the following services

I. Airport use agreements – The operations are those involved with setup of ticket counters, common use facilities and services (like toilets, kiosk machines, ATMs, packing machines, weighing machines etc), control and safeguard of gate and jet-way, fee waivers & incentives for the employees working inside the airport.

II. Bulk purchase programs – As airports handle a lot of people each day, huge amount of resources is required for the services that the airport provides. These services include passenger services (such as help desks, information centre, recreation facilities, shopping malls etc), catering supplies for the restaurants/food chains operated by the airport, tags for bags, ramp facilities and into-plane fuelling.

III. Tie-up services are those that deal with the outsourcing of the above and below wing services.

Contract compliance takes care of

I. Station manuals – This involves the preparation and maintenance of Station Operation Manuals enforcing customer standards and requirements. Also, the training of all airport contract members will be guided by Station manuals.

II. Performance standards and daily monitoring – There will be an everyday check-up of the performance of ground operations handled by ground handlers for smooth and effective functioning. Similarly, there will be daily monitoring of passenger services also.

III. Quality control – This is one of the major and prime sections of an airport service because the quality on any task should not be compromised as that affects the reputation of an airport. Once the good impression of passengers is lost, its hard to earn back, therefore, periodic check rides will be there to monitor the performance of vendors.

IV. Financial compliance – The most important part of any organisation is the finance as money is the driving force of a successful outcome. Auditing of services and invoices and budgetary controls are handled by this section.

Management of the Inventory

I. Inventory warehousing, controls, budgeting and purchasing are all managed by this sector. Below are a few examples that are taken care of.

1. Boarding tickets (passes).
2. Bag tags.
3. Lost and damaged baggage claim forms.
4. Catering and toiletry supplies.
5. Alcoholic beverage-controlled storage.
6. Cabin supplies.
7. In-flight magazines and related items.
8. Portable equipment (laptops, printers, etc.).

Financial responsibility

I. Prepayments & deposits, reconciliation of vendor invoices and escrow accounting services are the financial responsibilities of an airport.

1) Services to be provided for passengers

In a given business customer is god and to satisfy a customer good service is the best and most efficient way. For an airport passenger are its god and service to passengers is of at most importance. Few of the services are discussed below:

Airline visibility & branding – this includes the following

I. Airport signage – To avoid passenger congestion at any given point of time there must be a smooth transition of passengers into the airport, within the airport or out of the airport, so to achieve this there must be sufficient and legible signage all around the airport such that any passenger is not stuck at a point.

II. Airline attire for contract employees – There are so many airline services in todays world and there are passengers who fly with every airline according to their budget and convenience. After booking of tickets when a passenger reaches the airport he/she has to approach the representative of that particular airlines for further procedures. Therefore, the employees must be provided with an attire that consists of the airline logo or other identification so that passengers are not mis leaded.

III. Flight information Display Software (FIDS) - It provide the graphics for flight information data system for airport operations and for the information for passengers about the arrival or departure or delay of aircrafts.

Staffing of an airport

All the operations require particular staff for taking care of it. Majority of staffing is required by

I. Passenger check in (or ticket) counters – this task requires a reservation compatible equipment and handles the following operations

1. Issue of boarding passes
2. Baggage collection, tags and appropriate bar codes for appropriate movement of luggage and also collection of fees for excess baggage.
3. Upgrade sales and ass-collects as required.

II. Gate personnel – They are responsible for the boarding procedures, passenger manifest reporting and announcements.

Co-ordination

I. A problem at one stage for a passenger affects the further stages. Proper coordination between the operations are required because all the operations are inter- related in a way or other.

Catering

I. It is the service that provides food and beverages for the passengers and the crew. It has to take

care of services such as menu & vendor selection, supplies and inventory control, arrange sufficient meals for the crew etc.

Customer service

Involves two major and important services to be provided by the airport, one for the emergency and protection of passenger baggage and the other for reservations.

I. There is provision at every airport for lost and damaged bag claims and complaints. Also, customer care is available through toll free numbers and e-mail services to register complaints and claim baggage.

II. Reservations are also an important customer service. It can be done via online bookings, call centre operations or any software that is developed for the customer to handle his requirements such as yield, accounting, manifests etc.

2) Ground Services

Ground services are those operations that have to be taken care by the airport around the runways, taxiways and aprons. There are variety of them, some are listed below:

1. Loading/unloading of luggage into/out of the aircrafts.
2. Transfer of the baggage to appropriate destination.
3. Assistance provided to balance the weight accordingly.
4. Towing & push back of aircrafts.
5. Marshalling of aircrafts.
6. Aircraft parking assistance for both Remain Over Night and hard stand.
7. Provide support equipment for air conditioning, ground power unit and air start.
8. Fuelling of planes is also an important task of ground service.
9. Management of waste from aircrafts.
10. Cleaning and servicing facilities.
11. De-icing of aircrafts especially surface of wings.

3) Flight operations

Apart from landside, few airside operations should also be managed by an airport. They are discussed below:

I. Tracking of aircrafts

Customer satisfaction and security are given additional care in airport operations. One way of providing safety to customers is by tracking their aircrafts in real time with the help of satellites. This information helps them to determine down line decisions, delay in arrival or if any sub services are required. It also monitors the movement of other aircrafts.

II. Communication

It is also a crucial task to be managed. It involves exchange of messages between the airlines and stations at airport for information sharing and updates. Flight following is done to update information regarding flights for reservation tasks and down line stations. Airline operational schedule is also issued by the communication department, this schedule is provided to airport officials, ground handlers and passenger services.

III. Support services

It is the duty of the airport to acquire international landing rights and approvals from inland government agencies, agricultural department, immigration and customs.

Assist airlines with route planning for the most cost-effective route for airline and also safe for passengers.

Provide accommodation and transportation for airline crew members.

IV. Load control

Help in making decisions related to weight of the aircraft and balance issues. Make arrangements for transport and delivery of any baggage or passenger omitted due to operational reasons.

IV. AIRPORT OPERATIONS MANAGEMENT – FAA (PART 139)

The federal aviation administration has laid few compulsory operations that all the airport around the globe need to provide. These rules and regulations are mentioned in Section-D of part 139 which is Certification of Airports. They include the following:

1. **Pavement Management** – Pavement refers to the top most part (surface) of a runway or taxiway. It is either made of asphalt or concrete. The pavement must have sufficient load carrying capacity, it must be safe for operation of an aircraft, it must have the ability to provide good ride to the aircrafts. The minimum requirements for a pavement are: it must be clear of foreign objects (mud, dirt etc), no cracks or holes on the surface, it must be level and dry. The pavement must also be well lit for night vision, markings and signs have to be accurate. It is the

responsibility of the airport to keep the pavements well-maintained.

2. **Safety Inspection** – To maintain the safety of airport operations timely inspections are important. The inspections have to be carried upon areas such as aircraft parking (Apron), runways, taxiways, buildings, hangars, fuelling facilities etc. The need for inspection is to make sure that the above-mentioned areas are void of obstacles, tyre debris, ice or snow, animal hazard etc because the presence of any of these things will cause huge damage to the airport as well as the aircraft.
3. **Aircraft Rescue and Fire Fighting (ARFF)** – It is a mandatory service to be provided by all airports. The main motto of ARFF is to save lives. The capability of ARFF at airport has to be at its peaks because they mean the difference between life & death of all the humans on board. The time limit to respond to fires by ARFF is about 3 minutes. They must be well equipped and not be lethargic about the occurrence of accidents.
4. **Control of Ice and Snow** – The presence of ice/snow on the surface of runway or taxiway or on the aircraft itself will affect the ride of aircraft i.e., it will affect the friction between the aircraft tyres and the pavement, this will in turn cause problems in take-off and landing; ice on the aircraft will lead to loss of direction control & reduces aircraft performance. Therefore, to avoid any danger that might end up in an accident, there must be timely removal of snow and ice, appropriate material selection for the construction of pavement, notification to aircraft if any pavement is unsatisfactory.
5. **Bird/Animal hazard management** – Birds flying in and around airports have been a serious threat to aircrafts. They cause huge damage to the aircrafts which may lead to loss of human life. It is the responsibility of the airport to control the movement and presence of birds or animals within airside limits. Few control methods that could solve this issue are: use noise making equipment, this will scare the birds and they will move away from the airports, inform the traffic control about any movement of birds, cut down trees so that it will discourage bird population.
6. Other services such as NOTAM (Notice to Airmen) is present to update information about any hazards or change in component.
7. Traffic and wind direction indicators need to be setup to provide wind surface direction to pilots. For air carrier operations in airports without control tower a traffic pattern indicator and landing strip indicator must be put up around the wind cone for all the runways with right hand traffic pattern.

V. CONCLUSION

Thus, to conclude I would say that for successful establishment and growth of an airport, all the members involved in each and every stage must do their duties with great care and efficiency. A single person cannot do all the operations, there are numerous managers, supervisors etc. who have been given various responsibilities with expectation of successful work completion. The airports must encourage and appreciate people for their work. Dedicated work will run the operations of airport smoothly without any hurdle. The details of this paper highlights few of the most important airport operations. An airport cannot be certified without the facilities to provide the above mandatory operations. There will be periodic inspections by the International Air Transport Association to ensure that the airports are functioning with good standards and all basic facilities.

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