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Research Article

AIRPORT PLANNING AND MANAGEMENT SYSTEMS

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ABSTRACT

The world is in the 21st century and coping up with transportation is one of the challenges man kind has to adapt to consistently. The civil aviation industry has changed drastically where the need for sustainable airport planning and management is required to cope with the demanding air transportation of today. The importance of airport planning and management has to be addressed since airports are functional 24/7 and a proper management model (master plan) which is flexible, and dynamic should be implemented. Key aspects discussed in this paper include airport financial and business development, operations management, few case studies and future of airport management.

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INTRODUCTION

Airport Management is recognized as being the most important factor contributing to air transportation. The lack of functioning of one factor will affect the overall airport management and thus realizes the importance of coordination. Airport financial management and its business development is one of the key aspects where the strategies adopted and implemented in airports to earn revenue and attract customers are discussed. In general, airport planning should be flexible and dynamic where designers, engineers and sponsors should take a look into various situations and pursue opportunities that can arise. An efficient management system to tackle and solve problems immediately is required.

Planning and Management

Airport Planning

Airport Planning is the use of strategies for current and future management of airports. Management of Airports include operations management, design of facilities, airfield configurations, finance and the overall organizational structure. It involves a combined planning effort that is contributed by each airport at the local, state, regional or national scale. Strategic planning should be dynamic as it recognizes the high uncertainty in the aviation industry as we do not know what the future will bring. Planners, designers and managers need to

consider possibilities which leads to flexibility in the plan minimizing the risks involved.

Airport Planning

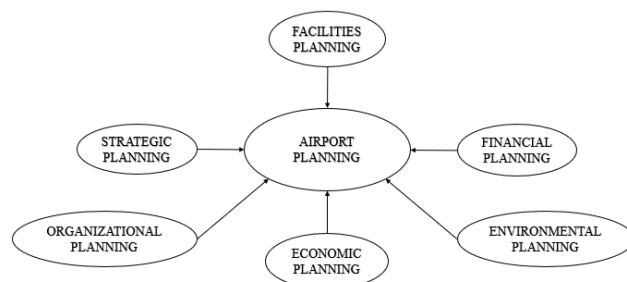


Figure 1 Parameters Involved in Airport Planning

Airport Master Plan

A master plan is a necessity for airport planning. The master plan is a document which lists the proposed strategies and plans to meet future needs. It represents the concept of the ultimate development of the Airport. Master plans are in the form of a written or graphic document and are applied to the expansion and modernization of the current Airport regardless of its functional role.[1]

Objectives of the Master Plan

- To provide an effective presentation of the development of the airport.

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- To establish and follow a schedule of priorities for the improvements proposed in the plan.
- To document alternatives in the established of the proposed plan.
- To provide a brief descriptive report so that the recommendations are clearly understood by the working community.

Key parameters required for the master plan.

Inventory

(Collection of data which includes an inventory of the existing airport facilities)

Aeronautical Activity

(The amount of aeronautical activity produced in the area. Record of current and historical aviation statistics)

Demography

(Transportation services will depend on the population and its potential growth)

Political Factors

(Demand for air transportation will also depend on the government actions such as taxes. Traffic routes for international air services will have an impact)

Community Values

(The attitude of the community, the recognition by the community)

Competition Position.

(Demand for air services depends on its present and future ability to compete with other alternatives mode of transportation)

The planning of the airport should be governed and initiated with the SWOT analysis. This approach guides us to understand the methods on how airports develop its activities physically and organizationally. As stated before, airport planning should rely on dynamic strategic planning. Having an inventory of existing conditions, forecasting the range of future traffic, facility requirements are the essential parameters to be considered for dynamic planning.

Dynamic strategic planning requires the team to have a look at many possible scenarios which could be a hard task. Computer models are available which provides tools for simulating and investigating these scenarios.[2]

Airport Marketing and Business Development

While a substantial portion of marketing is carried out by the tourism industry business/travel destinations industries, there still is a need for travel enablers such as airports to promote themselves and function as part of the marketing medium. A pure entrepreneurial approach, a collaborative leadership approach with its analytical skills is required to define and implement business development initiatives along with marketing strategies to achieve the goals.

Working with Division and Department leadership, the Marketing and Business Development Manager will concentrate on increasing revenue generation and maximize airport land/facilities development and redevelopment opportunities through the creation of short and long-term strategies. This individual will also take initiative to cultivate

and enhance an organizational culture of community engagement by developing relations, outreach programs, and coordinating special events with the aviation business community.

Along with reduced travel costs, airports have put in effort to promote and market itself by learning and adapting to new and effective techniques. Taking Changi International Airport for example, it has launched several campaigns such as “Be A Changi Millionaire adopting a strategy to involve travelers to participate. [3] Having world class facilities such as relaxation areas, heritage areas, playgrounds, entertainment areas, gardens etc are part of business development and marketing strategies Changi Airport relies on to attract clients.[4]

Airport Financial Management

Financial management includes the accumulation, communication and the interpretation of the economic data relating to the financial status of the airport which is the result of the operations for decision making. Financial statements are required to report to the government authorities as well as the local community about the details of the airport’s operations. Having a good accounting system can help in airport management in the basis of allocating resources, reducing cost where necessary and overall improvement of control.[5] Financial statements include the operating expense of the overall airport, the liability coverage, the operating coverage and the cost which is to be incurred in planning and administering the airport.

- Operating Expense
- Airport Liability Coverage
- Planning and administering of an operating budget

Organisation

Organization Structure (Roles and Responsibilities)

The organization structure from the operations level up to middle management level should be extremely proactive, flexible, dynamic and highly service and customer oriented.

Layers of Organization in Airport

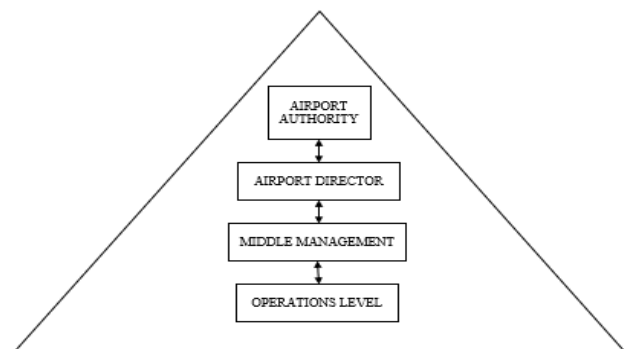


Figure 2 Representation of hierarchy in the organization

At the peak of the hierarchy lies the airport authority which is state owned or private. Next comes the airport director. The airport director is in charge of the entire day to day operation of the airport. He or she reports directly to the airport authority. Directing, coordinating and conducting frequent reviews through subordinate supervisors is part of the job. The middle management usually is focused on short term goals and metrics

related to airport operations, efficiencies, customer satisfactions, ratings and issues/defect management. Their job would also cover pro-active procedures and processes, keeping in line upper managements targets.

At the other end of the hierarchy, lies the operations level where basic day to day activities happen and there is frequent interaction with the customers. Operations level includes security staff, reception staff, grounds manager, baggage manager, airline staff etc. Each group in the hierarchy are related to each other and efficient communication and coordination is required in order to achieve the targets set by the airport directors.

The diagram below shows the representation of the engagement level with the customers. Frequent interactions with the customers are achieved by the operations staff where their duties are to keep the flow of task running smoothly without any disruptions. The executive level plans are long term goals and for this to be achieved, the middle management and the operations management have to plan and create a model which satisfies a series of short termed goals

Customer Engagement/Service Level

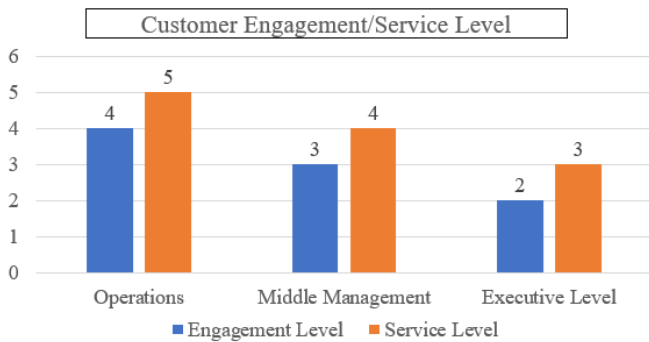


Figure 3A pictorial representation of engagement level of customers

Operations Management

Operations Management is one of the most crucial elements of airport management. The airport serves as a medium for air travel with its passengers it serves daily. Like any other organization or infrastructure, its function is to meet the community’s requirements and that of various airlines agencies around the world. To function as an airport, there are various daily operations that range from airside, ATC to security which have to be carried out every second in the airport to ensure its use, name and to gather trade. The operations of an airport are carried to meet the requirements of airline agencies, the general public and the stakeholders of the airport to ensure its safety and reliability.

For example, an airport known for its runway or any other special feature will not gather name and trade if it is not maintained regularly. The branch of maintenance which deals with managing the day to day operations of the airport is called Operations Management.

In an airport, there are numerous operations ranging from Airside Operations such as Runway, lighting to ground operations such as security and building maintenance. For example, airports have several airline agencies functioning and it is up to the airline agency’s ground operations staff also called ‘station control’ to coordinate the operations of the

aircraft and its crew and process the passengers of the airlines along with baggage and cargo[6].

The inspection and maintenance of all the facilities existing in an airport is essential to guarantee the safety of airport operations. This poses as an issue for operations management for planners, designers to thoroughly innovate and also for managers to implement regulations and inspection checks constantly. One example of such a regulation is the 14 CFR Part 139- Certification of Airports which sets activities, policies and standards for operations and management.

The categories of operations management an airport has to follow are:

Record and Administration Documentation

Any certified airport is required to maintain formal documentation of records and policies to provide a brief description about organization procedures, zones of the airport etc.

Maintenance and Operations

Airports need to have procedures and policies for the operation of events such as controlling movement in and around the airfield as well as the landside.

Safety Management

In the event of any emergency, airports are required to have formal evacuation and safety plans for the passengers and employees of the airport.

There are various inspection checks mentioned below required under the Act, 14 CFR Part-139 Act.

Pre-inspection review

Concerning airport office files and certification manual.

Briefing about Airport Management

Involving organizational schedule concerning various airport personnel.

Movement Inspection

Which classification of each area or zone of the airport and maintaining a safe environment for movement.

Emergency Inspection

Safety drills and procedures should be conducted constantly to ensure safe and smooth airport operations.

Airport Manager and Public Relations

The main function of an Airport Manager is to ensure safe and efficient operations of an airport, coordinate between various sub-divisions and roles of all the employees and manage them

The functions and duties of an Airport Manager are as follows

- The Manager plays the role of a landlord by ensuring safe and efficient operations in the airport which is his/her greatest responsibility as well as managing the airport structure and land.
- He also plays the role of a business executive in managing public relations, financial planning, airline management which includes tenants, passengers, shopping outlets and restaurants.

- The improvisation of services, facilities the airport offers to its stakeholders and the general public is an important feature in the duties of a manager.
- He must implement regulations, expand business trade and oversee expansion and development in the airport.

Public Relations is the Management of services and facilities of the airport intended to cater and deliver the needs and expectations and to create a goodwill between the Airport Organization and the general public. Public relations and opinion are key to an Airport's current and future development. Public Relations of an Airport can span from past or future customer experiences to tenants and employees and all constituents are important for the overall future of the airport. Objectives involve creating a goodwill between the airport and its customers through public communications, events to promote the airport within the community and globally.

The airport also has to build a good rapport with its neighbors by functioning in an eco-friendly way and resolving environmental issues with the public which arises from inconvenient operations such as noise pollution or traffic congestion.

Case Studies

Kempegowda International Airport, Bangalore

In airports, it is estimated that passengers spend at least 1 hour for the required boarding procedures which involve standing in queues for baggage check-in and boarding confirmation which makes the entire process extremely tiresome. However, passengers need not have to follow the above procedure with the introduction of E-boarding, E-Visa and more.

Safran Identity and Security has designed and developed the process of Biometric-enabled E-Boarding along with Bangalore International Airport Limited. This procedure of E-Boarding is based on the concept of real-time Biometric Authentication. It has enabled passengers to board using their Aadhar cards. Passengers can now complete all required boarding procedures with a simple hand wave. The system which enables this process is called MorphoWave. It is a friction-less, high speed fingerprint scanner which scans the fingerprints of the passenger in less than 1 second through a simple hand wave. It is faster and much more convenient as compared with other scanners.

This procedure improves passenger travel experience through its easily accessibility in all checkpoints of an airport and reducing waiting time and paperwork. Safran is one of the leading international group focussing on three core businesses namely, Aerospace (Propulsion and Equipment), Defence and Security. Safran Identity & Security is a leader in Identity and Security Solutions worldwide establishing its systems in more than 100 nations. It has over 40 years of experience in biometrics and is known for creating technologies for the public and private sector. Some of these are include public Security Solutions and secure transactions [8]

Changi International Airport, Singapore

In 2012, Singapore Changi Airport was the winner of the National Infocomm Awards for its innovative use of infocomm technology. In 2013, it was crowned at the Skytrax World Airport Awards as the world's best airport. CAG which is the

Manager of Changi Airport has teamed up with Salesforce.com which provides Changi Airport the necessary tools required to deliver a first-class experience to all its passengers. Studies have shown that commuters or passengers do not focus much the details of the services provided at airports. Going through some airport services can be a chaotic experience at times. Customers get a good feel when the services provided match their expectations and create a sense of joy.

Changi Airport Group houses 350 retail and service stores and 120 food and beverage outlets located outside as well as in the transit area and 200 partners and agencies which range from cleaners to baggage handlers.[9]

Schiphol International Airport

As mentioned in the earlier example of Changi International Airport Singapore, the goals of any airport is to provide a first-class experience to all its passengers through its facilities. A clear example in this case is Baggage Handling in Amsterdam's Schiphol International Airport. Baggage Handling is one of the facilities that make the passenger's experience delightful. Mishandling or misplacement of baggage is estimated to account to a loss of US \$2.5 Billion worldwide. It has been calculated that 51 million passengers in Schiphol Airport alone face this issue annually.[11]

In 2004, 3 organisations namely Vanderlande Industries, IBM Corporation and later on, Grenzebach Automation System joined together to solve the issue of innovating Baggage Control System for Schiphol International Airport which is one of Europe's and the world's busiest airport hubs. Investing a US \$ 1 Billion in a 10year duration, the goals planned at Schiphol were to increase the baggage capacity from 40 million to 70 million, reduce price for every bag without increasing waiting duration and to account for a maximum loss of 1% in baggage misplacing.[10]

With Schiphol's massive baggage conveyor network spanning up to 21 kilometers in tracks, 9000 storage capacitors and 6 robotic units, the goal is very simple which is to move the baggage in the right place at the right time. The network source code is of 3 million lines. Few of the most advanced technologies used in Baggage Handling Systems include RFID or Radio Frequency Identification and Automatic Bar Code Scanners. The goal of these systems is to operate 99.99% of the time and still being able to reduce loss and damage in that 0.01%.

Future of Airport Management

With the booming development of the aerospace and aviation industries in the world, it is very challenging to analyze the future of airports and the aviation industry, but through predictions and forecasts, we can set standards and goals for future developments. There have been significant developments in all fields of airport management which have occurred as a result of external events such as the enforcement of security after the infamous terrorist attack on September 11, 2001 and the development of technologies such as NextGen for Air Traffic Management.

The future of an airport is designed and planned based on the following criteria and objectives:

- Enhancement of Safety:-The one area of safety that is still raised is airfield operational safety. Although accidents are not common in airports, but a simple misunderstanding or failure such as a damaged light marking can lead to catastrophic events. To prevent such events, airports are equipped in each of its sub-divisions such as SMS, emergency lighting and marking on runways, safe zones and more.
- Environmental Consideration:-As mentioned previously in public relations, environmental consideration plays a crucial role in airport development. Issues such as global warming, hurricanes are caused as a result of man-made activities that can lead to serious consequences. Efforts have to be made by the airport in operating in an eco-friendly manner.
- Future Business Strategies:-One of the most important criteria for future of airports is its future financial planning. Today, airport organisations create and optimize on strategic business models for revenue, operation, expansion to improve financial planning. Along with planning, marketing and advertising through social media is the current trend airports follow these days.
- Globalization:-The airline industry has expanded rapidly from the early 20th Century from district level to national and has expanded globally as well. As a result, services such as terminals, hangars, cargo facilities and even growth in the aerospace industry has expanded resulting in the exponential growth of airport requirements and standards. These requirements and standards will pose as a challenge in future. [7]

CONCLUSION

This research is limited to areas covered in this paper, but the opportunities to enhance airports in many aspects are still available. This paper is mainly to highlight the importance of airport management and the planning required for the functioning of the airport. Case studies in the paper have shown how airports can progress in many aspects to satisfy consumers and build relationships with partners. Future studies indicate various areas where airports need to improve on to compete with other transportation industries and to cope up with the rapid changes in air transportation. Addressing management techniques and having a dynamic model will be suitable for managing the rapid changes and growth of an airport. Anticipating changes and staying relevant to the course to the future of airport management is necessary.

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