PLANNING AND DESIGN CAPACITY AND AIRPORT INFRASTRUCTURE

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The following article is devoted to planning and development of existing and future airports, and individual plans, necessary to the construction of an airport master plan and the overall planning system at various levels.
K e y w o r d s: planning and development of the airport, airport master plan, layout, financial plan, zoning plan, environmental plan.

1 INTRODUCTION

The airport is an essential element of the air transport system. Generally speaking, it is a set of pathways, spaces and buildings to serve a variety of airport users. Since the airport do not act as local users, but also international, airport should meet the standards and requirements of an international character, which are adapted to local conditions.

Due to continuous development of new technology, changing requirements and individual airports should be adapted to them when they want to continue to be used. Any changes to be made at the airport must be carefully planned as far in advance.

Planning and design for every airport, whether existing or future, is a complex process of assessing and analysing the various factors that effect on him. On completion of the analysis comes into the process of planning and design, which is materialized in the form of plans.

2 PLACE AND ROLE OF AIRPORT IN AIRCRAFT

Airports today are complex, in which passengers and airport visitors find they can offer different services, not just air. Therefore, the airport can be viewed from several perspectives, such as.:

- operating;
- economic;
- social unit;
- part of the environment.

3 AIRPORT PLANNING

Airport planning can be defined as a service strategy at a future that includes the operation of airport facilities, airport runways and arrangement of space, cost and income, impacts on the environment and organizational structure.

Airport planning is always focused on a period-planning horizon, which varies depending on the size requirements for change to be made. The planning horizon may be short, medium, long - planning for several months, 1 year, 5 -, 10 -,20-years.

Airport management must in the planning of airports to handle different types of studies - plans with regard to the period when to begin implementation of the plans, particularly those relating to airside.

Plans, airport planners have drawn up such:

- Plan equipment
  - by focusing on the future needs of airport infrastructure such as: take-off and runways, Taxiways, parking of aircraft, airport runways and lighting areas, communication and navigation systems, car parks, land access infrastructure - airport fuel system, electrical wiring, non-avionics land use - parks, hotels, restaurants, car rentals
- Financial plan
  - deals with the anticipation of future costs and revenues, budget and resource planning, financial support and subsidy programs of the bonds, private investment
- Economic plan
  - the expected future economic activity, such as trade and business industries that exist at the airport and off airport and the immovable property which has a direct or indirect impact on the operation of the airport
- Environment Plan
  - By focusing on maintaining and improving the existing state of the environment with respect to future activities of the airport. Environmental planning includes planning, noise mitigation, wetland reclamation, conservation of wild fauna and flora around the airport
- Organizational planning
  - consists of the requirements for future action by the airport, the airport company's organizational structure, personnel and staff activities related to airport
- Strategic Planning
  - Includes all of the other planning activities, seeking to maximize the future potential of the airport to the community.

4 SYSTEM OF AIRPORT PLANNING AND DESIGN

System planning and design of airports, trying to make the airports at regional, national or state level were part of a coordinated aviation system. With the system planning and design of airports, like a development objectives align with airport cities (municipalities) that are nearby.

The planning and design of airports to regional

The planning and Airport planning at regional level is a system of airports that will benefit the whole region. When is planning, designing of airports, taking into account traffic at all airports, large and small, in to throughout of the region. Originally this system was designed and airports would be developed independently, without coordination.

Division of operation between regional airports are including political, technical and economic issues, which in turn can significantly affect the future growth of the airports. For example operation for more use of the airport is growing, but will be required at the airport and board design organizational changes in order to continue to develop the airport. It should be operating at the airport and control transferred to other regional airports. It is certainly possible that the implementation of operations at the airport will be no restrictions with that the operation is broken down throughout the day and not boasting just a few hours a day. No busy airport just voluntarily give up take-offs and aircraft landing at its airport. Even when the situation arises to more and less congested airports are still operated by the same operator.

Each small airport, the airport management must make enormous efforts to make its airports and popular attracted new airlines. This means administrative provisions relating to the bid, access roads and other measures that will increase the attractiveness of the airport.

The development of airports and planning new airports should also consider that airport operations were in line with other modes of transport to avoid such a disproportionate burden rail or highway traffic.

The planning and Airport planning at the state level

Planning and design of state level is trying to develop an airport system throughout the national territory, not only metropolitan but also rural areas. This planning is done on the period of 20-30 years and is divided into smaller sections (5, 10, 20 years).

In any case, estimates of future planning needs are developed based on a comparison of existing equipment and future projections of traffic at the airport.

The main feature of the development plans and the largest part of each document is a detailed list of action planning, which includes class airport and type of improvements. The most common types of improvements to the acquisition of land (building new airports or expansion of existing airports), repair or extension of runways and areas (runway, taxiways, aprons, roads and parking), installation of lighting, landing and navigational aids and construction of buildings (terminals, hangars, administrative buildings).

The state planning in USA

Before 1970 very few states in the U.S. carried out extensive and systematic planning of airports. An important incentive for the authorities was the beginning of the comprehensive planning of airport and surrounding roads (roads) which result from the law began in the same year. Under the leadership of the FAA (Federal Aviation Administration of USA) began to develop "National Aviation System Plan – SASP", which is a list of work that needed to be done, but mainly served the needs of planning funds. SASP id still current and serves as an aid in planning and distribution of state funds.

The planning and Airport planning at the national level and

The planning system is found in the U.S., where the FAA is responsible for airport planning at the national level to provide guidance for the development of large public networks that are owned airports and provides a reference framework for the investment of federal funds. These interests are listed in the National Plan of integrated airports (NPIAS), the document falls under the Airport and Airway Improvement Act of the 1982nd NPIAS is a 10-year plan that is adjusted every two years and works closely with 10-year investment plan FAA. It is to improve air traffic management system and airspace.

NPIAS is not a plan in true sense. It is not in it to set priorities, determine the timing, suggesting levels of funding, or identify concrete steps the federal government. Instead, it is only a statement of the cost of developing the airport, which could arise during the planning period at airports for federal assistance.

Estimated requirements contained in the NPIAS are developed by comparing FAA and forecasts customer in the terminal area of dishes in the current capacity of each airport. FAA regional offices are many initially set necessary to regularly update and monitor the changes and developments that are performed at airports.

The improvement NPIAS airport has three levels:

- Maintenance of airfields pension system the current state
- Collection system to current design standard
- Extension of system

Maintaining the airport system in its present state also includes projects such as runways and changing areas, replacement of lighting to the extent to suit standard and expansion / extension of runways for larger aircraft. Classification of supported and unsupported projects under the program is a bit misleading, because individual projects reflect the priority with which should be assisted to a particular project. Projects that have high priority, the FAA agrees that it and help a local sponsor, the project implementation can commence as soon as possible and may not correspond with any level of the NPIAS. Extension of the project in an extremely important and felled mushroom airport, but has a higher priority and more urgent as the under-utilized airport, which is planned to improve only in so far as to meet current requirements and standards.

5 AIRPORT MASTER PLANNING

Master plan n airports are a project concept development of a final airport. Research represents a logical solution for development, which are displayed graphically and in writing accompanied by a message of the future development of the airport. Master of airport plans are used to upgrade and expand existing airport or build new airports, regardless of their size and orientation.

Typical Master Plan prepared for the airport 20-year planning horizon.

The main objective of master planning the airport is to provide guidance for future development of the airport, where demand will be satisfied and will take account of aviation impact on: environment, local development, other modes of transport and other airports.

Although there are considerable differences in the content master airport plans, the basic results must include a description of the desired future structure airport; description of the steps needed to achieve a financial plan of airport development. Airport Master Plan is generally made of the following parts: stocks, assuming activity, demand / capacity analysis, facility requirements, alternative proposals and financial plans.

Steps of preparing the master plan:

The first step in preparing the master plans of airports is a collection of all types of data relating the area where the airport is located. This includes an inventory of existing airport facilities, land-use planning efforts, which could affect the Master Plan airport, and historical information relating to their development. This survey will provide the basic information needed to master plan. It will also provide basic information on the development of forecasts and facility requirements for airports.

The second step is a historical overview of airports and their equipment, which includes all the changes, which were made at the airport, whether its infrastructure and property.

The third step is to determine the use of airspace close to each airport in all areas which provides air navigation services; communication and security in the area are natural or artificial barriers or structures that could affect the use of airspace airport.

In a later extension of the airport planning must be verified by existing routes, and tracks, their compatibility with the proposed airport development.

The fourth year of the subscription is land uses near the airport, which is essential in the planning process is necessary because it is determined by the feasibility of expansion and whether this expansion will be compatible with surrounding areas and vice versa.

Sufficient data obtained help to the emergence of models for future road location and orientation of the roads near the airport. Suggestions for connecting the airport to other transport systems, must be processed in accordance with applicable laws, rules and regulations so that they can be applied also to the development master planning airport, because the resulting use of airport land affects the development of the airport.

The fifth step is the amount of air operations, which will be in the area. Taking account of the air current statistics, data from the past the airport operational use, as well as the number of passengers / cargo, aircraft movements and other aviation activities. Evaluation of the air data with regard to socio-economic factors of the area, form the basis of forecasts of aviation activity for the area. Among the socio-economic data include: demographics, purchasing power of population, economic activity and status of the industry, geographic factors, competitive position, political factors and community values.

6 AIRPORT LAYOUT PLAN

The graphical representation of airport and its surroundings is airport layout plan, which graphically presents the range of existing and proposed airport facilities and land use, their location. It refers to the dimensional data necessary for legislative approval in accordance with applicable standards. It shows the airport location, clear zones, approach areas, and other environmental features that might influence airport usage and expansion capabilities.

Airport Layout plan identifies areas that can be rented, sold or used for other commercial / industrial purposes. The plan is updated whenever changes occur: the property, the management company, in the layout of the airport (this includes the runway, taxiing runway, aircraft stands for - their size and location), buildings, parking for cars, cargo facilities, navigation aids, obstacles and access roads.

Map of Situation airport map contains the layout airport; location maps, environment maps, navigational aids, basic data and weather information (info for airflow) and noise map public transport infrastructure in relation to airport.

7 FORECASTING

Airport Master Plan is based on forecasts of the airport. Forecasts of airport development are based on the relationship between demand and capacity of airport facilities and the results are up a development plan for a specific time period. This period can be 5 -, 10 -, and 20 - years.

Planning, development, forecasting is based on two methods: qualitative and quantitative forecast of development. Qualitative methods are planning subjective approaches and specific knowledge of experts. Quantitative methods of planning are various statistical methods and methods to verify the status and balance of resources needs (economic-mathematical methods).

Forecasts of demand for air transport are the basis for planning facilities at the airport. I t is necessary to know: types of airport users, carriers and visitors; use the airport for civilian and military aviation; types and amount of operating activities (operation and maintenance of aircraft, passengers and cargo); use of airports with aircraft: small commercial, commercial and private aircraft, aircraft with vertical/short take-off or landing, etc.

Prognosis of individual activities at the airport and using qualitative and quantitative methods, planners are able to predict the activity at the airport.

8 THE TECHNICAL AND OPERATION PLANNING

After establishing a list of current equipment and forecast future activity at the airport, the next step in the process of planning, preparation of technical and operating parameters of the airport. Based on the analysis of demand and airport capacity to create an estimate for the expansion of facilities, includes the cost estimate. The analysis refers to the interaction: dispatching aircraft - passenger service - the terminal, its design - business - equipment for cargo - access roads - public transport - other appropriate improvements that should be done.

Aircraft operational requirements

In compiling the airport master planning must assume what kind of aircraft in the future airport use, and will discuss of civil / cargo aircraft, and according to data collected by aircraft must be designed physical dimensions airside, even though the analysis of airport capacity the data it contains.

Capacity analysis

The total airport capacity is determined by the capacity of the premises, the terminal airspace and ground handling. The capacity of the premises is the maximum number of aircraft movements at take-off a runway and taxiways. Capacity is not sufficient as a consequence will create delays and waiting aircraft. The capacity of the airport airspace affects mainly the relative positions of runways; and airport operations (IFR / VFR).

Terminal capacity is defined as the ability to accept a terminal passenger, cargo and aircraft that are operating in areas of the airport. The terminal facilities shall be designed so as to be able to take / check in as many passengers / cargo. Terminal capacity depends on the number and position: s gate, aprons for airport companies, cargo, general aviation, airline terminals, terminals for general aviation (cargo); buildings parking for cars and equipment ground handling of aircraft.

Design alternatives

When planning the construction of the airport, airport planners have developed a series of design (design) alternatives and adapt their requirements to the airport.

Design alternatives for airport development or construction shall include details of:

- Runway orientation and wind analysis
- Airspace analysis
- Surrounding obstructions
- Availability for expansion
- Availability of utilities
- Meteorological conditions
- Economy of construction
- Convenience to population
- Noise

Terminal planning

The primary objective in planning the terminal is to achieve an acceptable balance between passenger comfort, operating efficiency, equipment financing and aesthetics. A characteristic feature of terminal planning should be to achieve comfort for passengers in transit from arrival at the airport until the plane and sleep.

Arrangement of terminals and service areas are designed to be flexible enough to meet and operational characteristics of the clearance of passengers, baggage and aircraft ground handling and thus minimize the time gate-occupancy of, achieving maximum operational efficiency of airlines.

The ultimate goal of planning is to create a terminal complex, which will provide all necessary services to optimal spending of funds in terms of investment, operating costs and maintenance costs. This takes into account the possible future expansion of the terminal building.

Terminal planning is necessary to assess its spatial distribution in terms of two criteria. The first criterion is a general account of how the terminal should look like. The second criterion is the actual functional requirements and operational use of the terminal.

The estimate passenger demand, individual equipment and estimate space requirements can be estimated more accurately determine the size and placement of equipment and number of passengers and luggage, which will create specific requirements for building an airport terminal.

When planning the terminal would also be considered with its future expansion, not only of space but also changes the solution s gate, air bridges. At each step should be taken into account also the balance between investment, look, operation, maintenance costs and income from rental of space for passengers and airport.

Airport financial planning

The financial plan is the economic evaluation of the planned airport development, in which the activities of the forecast in terms of income and expenditure. For financial planning are considered Financial resources and ways of financing the proposed airport development.

The financing of the existing airport is mostly used by external resources, which can finance:

- commercial loan;
- credit-specialized financial institutions to support development;
- bonds;
- through privatization;
- European Structural Funds.

Airport their revenue needed to cover the investment costs, cost management, aerodrome operations and maintenance derived from airport charges, parking and rental business.

Each airport would have made a list of economic opportunities that will serve to cover the costs of airlines = list of expected returns. These areas include the landing area, aircraft aprons and parking areas, airline terminal buildings, public parking areas, cargo buildings, aviation fuel, hangars, commercial facilities, and other usable areas.

Land-use planning

Territorial Airport map shows land use in and around the airport. Work carried out in the airport, the city, county and state must be mutually coordinated. Configuration runways, taxiways and planes of approach are essential for the development of airport land use plan because this plan is an essential part of the overall land-use planning program. Location, size and layout of the airport itself must be coordinated with housing and other land use around the airport, such as roads and utilities.

Environmental planning

At each airport planning must consider the impact of the airport and its surroundings on the environment (noise, air quality, water). For this reason, any airport leaves to produce their own studies that show the real situation, the airport and its surroundings in the environment. Every airport should endeavour to have the least negative impact on the environment.

Environmental (ecological) impacts on the surrounding airports are usually the main reason that limits the expansion of airport capacity.

Factors associated with the construction and operation of the airport and adversely affect the environment can be divided into:

- noise and vibration;
- air pollution;
- water pollution and land;
- impact on flora and flora;
- waste management.

9 ANALYSIS OF THE CURRENT SITUATION IN SLOVAKIA

At present, Slovakia is opened 97 civil airports, 13 of them have the status of a public airport, 13 non-public status of the airport, 8 and 63 heliports aerodrome to aircraft work in agriculture, forestry and water management.

Air transport in Slovakia is well placed for its development, but even though many times the airport companies and airlines, which are established in the Slovak airports exploit their potential. Interest of foreign people increased in Slovakia, especially with regard to tourism. But he cannot develop if the nation-wide transport network is not connected to each other and to the many tourist attractions, places to get the problem.

Small airports of regional significance in Slovakia have a sufficient number of passengers per year as high to cope with their own funding. Therefore, the State intends to maintain, must continue to participate in financing their operations. Also, there is no real expectation that the increased number of the passengers at airports in the horizon of 5-10 years. If the increased number of the passengers at small airports, the runway capacity would have to increase would mean investment in reconstruction a runway extension.

The transport policy of the Slovak Republic in aviation security is the growing needs of the service at the airport in the required quality, while regulating the environmental impact. The small airports development increase to the representation of aviation in the transport system in Slovakia, but also throughout Europe.

10 CONCLUDING REMARKS

Airports form complexes of various buildings and facilities that are essential to its operation. Actual operation of the airport but the airport going through the planning process, taking into account all factors that will affect its smooth operation. The factors that may affect it, should be taken into account when planning and design of the airport. Airport planning process consists of a set of knowledge that helps the fact that the airport of their potential to the greatest extent possible.

Airport planning is a set of plans, which are grouped all the requirements, knowledge and recommendations suitable for airport master planning. Master the airport map is an airport alone, since it must take into account their needs. The master planning airport either existing or planned airport is situational, geographical, financial, environmental plan and the technical and operational parameters of the airport facilities. Each of these plans is complementary, resulting in a functional airport.

Currently, placing more emphasis on the development of smaller, regional airports, as they have in most cases still is able to further expand and thereby increase their capacity. Major airports are in this respect limit of e, as extending to the area where the building is too crowded. Therefore, opportunities to develop their focus, not by building new runways and areas, but more efficient in their use that can of course be subject to some form of construction, reconstruction, equipment, buildings and areas of the airport.

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