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Control and Monitoring Measures States should apply in a Privatised Airports Environment

AIRPORT OPERATIONAL EFFICIENCY

by

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1 Introduction

1.1 The main ICAO objectives are to, amongst others, develop the principles and techniques of international air navigation and to foster the planning and development of international air transport so as to:

- Ensure Safe and orderly growth of international civil aviation;
- Ensure Safe, regular, efficient and economical air transport; and
- Encourage the development of airways, airports, air navigation facilities and services.

In a privatised airport environment, there is a need for States to regulate and oversee the airport management and operation to ensure the above objectives.

1.2 The principal aspects related to airport management and operation which require appropriate regulation include the following:

- Operational Safety
- Aviation Security
- Operational Efficiency
- Development Planning
- Environmental Protection
- Financial Efficiency

1.3 Some of the benefits of implementing airport privatization programmes are known to be related to efficiency and investment, and also the impact on the user and customer, passengers and airlines, including improved levels of service and customer orientation. Preservation of operational efficiency standards is however not guaranteed, particularly with conflicting interests between the different stakeholders. State regulation of operational efficiency is therefore considered prudent to ensure that the interests of airport users and customers in relation to operational efficiency, as well as safety, are safeguarded.

1.4 Regulation of airport operational efficiency requires the definition of operational efficiency standards and criteria. ICAO promulgate standards on operational efficiency where these are applicable to all international airports and in many cases where these have an impact on operational safety as well. States however require further operational standards and criteria which are specific to the characteristics and objectives of national airport operations.

1.5 Regulation of airport operational efficiency however also requires methods for the legal enforcement of the standards and criteria. The provision for enforcement can be stipulated in national legislation and operating guidelines for the airport's management authority. In the case of privatized airports, operational standards and criteria also need to be defined in the terms of reference for proponents, reviewed during proponent bid evaluations and included in concession or sale contractual documentation. Enforcement by States that operational standards and criteria are maintained in accordance with ICAO and national regulations, and the requirements of concession contracts, can be facilitated through the provision for the periodic certification of airports and the issuance of operating licenses. Albeit not in the interest of the State, airport operator, airlines nor users, States should ultimately have the ability to withdraw a concession or halt airport operations to ensure continued enforcement of operational safety and efficiency standards.

1.6 This paper addresses the control and monitoring measures related to airport operational efficiency which States should consider, particularly in an environment with private sector participation in the ownership, management and/or operation of international airports.

2 Airport Operational Efficiency Principles, Characteristics and Measures

2.1 An airport is an operational system comprising of a framework of infrastructure, facilities, equipment, systems and personnel which collectively provide a service to a customer. The users of airport services are passengers, freight and aircraft. The airlines transport passengers and freight, and operate the aircraft, and are therefore, the direct customers for airport services.

2.2 An airport is an inter-modal transfer facility between ground and air transportation. The functions of an airport are also the following:

- Processing facility for passengers, baggage and freight
- Servicing facility for aircraft
- Port of entry and exit for clearance of international aircraft, passengers, baggage and freight

Principles

2.3 The operational efficiency at an airport can have a direct impact on safety, user and customer satisfaction and the financial performance of the airport, airlines and other service providers such as government inspection; passenger, baggage and freight handling; and aircraft ground servicing agencies.

2.4 ICAO requires that States shall take all the necessary steps to secure the cooperation of airport administrations, airlines and airport service providers in ensuring that satisfactory facilities and services are provided for rapid handling and clearance of passengers, crew, baggage, cargo and mail at their international airports. Such facilities and services shall be flexible to accommodate changes in traffic characteristics and capable of expansion to meet anticipated growth in traffic volume.

2.5 To achieve this objective, States should monitor and have measures to directly or indirectly influence the performance of airport operators, airlines, air navigation agencies, government inspection agencies and other airport service providers.

Characteristics

2.6 The operational efficiency at an airport is driven by air traffic volumes and characteristics, operating procedures and performance, and facility capacity. Traffic characteristics which can influence the demand on airport facilities and services include peaking, international/domestic passenger ratio, aircraft type mix, etc. Facility capacity, given compliance with standards for adequacy and safety, relates to the accommodation of traffic throughput.

2.7 Over-provision of capacity results in under-utilization of facilities, and therefore financial inefficiencies. Under-provision of capacity results in operational efficiency deficiencies, which can also cause financial inefficiencies.

2.8 Industry experience has demonstrated that, in general, operational efficiency at airports can be enhanced by a competitive environment created between multiple ground handling and service providers at airports. The presence of too many providers of the same service can however result in the reduction of economies of scale with duplication in the provision of space, facility, equipment and personnel requirements, resulting in congestion and higher operational costs, and which can also have an effect on safety and security.

2.9 ICAO recommends that airlines have the option to provide their own services for ground handling operations or contracting such services from the airport operator, another airline or another organization authorized by the airport authority to provide such services. Any potential effect on safety and security related to the presence of too many agencies at airports should however also be considered.

Measures

2.10 Operational efficiency can be measured against defined user level of service criteria and performance standards. Level of service can also be measured by surveying users' subjective perceived level of service. Level of service is a function of space and time, and to a lesser extent distance, resulting in a level of comfort and convenience experienced by users. Performance standards for equipment relate to reliability and effectiveness. Individual incidents, accidents and equipment non-performance usually results in an interruption to a service and this also reflects on the overall operational efficiency.

Measures of operational efficiency can include the following:

- Congestion – space and comfort
- Delay - time
- Processing times
- Direct and uninterrupted flows – convenience
- Incidents – emergencies, collisions, bird strike
- Deficiencies – infrastructure, facility and equipment performance

2.11 The two main methods for measuring operational efficiency are by observation of actual occurrences and simulation testing of hypothetical scenarios. Observational surveys and data analysis can be used to study existing situations and facilities with known characteristics. Simulation methods are convenient tools to test multiple options for planned new facilities and/or changing circumstances.

2.12 As an airport is an inter-modal transfer facility with multiple transportation system elements, the objective should be that the efficiency of processing users in each element and transfer between elements should be balanced to provide a constant perception of level of service. Underprovision in the level of service in one element will reduce the perceived level of service for the whole system. Overprovision in the level of service in one element will not distract from the overall perceived level of service for the system.

3 Measuring Operational Efficiency in Airport Elements

3.1 The primary elements of an airport where operational efficiency can be measured are summarised as follows:

- Airspace and Airfield (Aircraft)
- Support and Emergency Services (Aircraft)
- Passenger Terminal (Passengers, Visitors, Employees)
- Cargo Terminal (Freight and mail)
- Terminal Landside Ground Access (Vehicles and fixed transit systems)

ICAO Annexes 9 – Facilitation and 14 – Aerodromes contain standards, recommended practices and guidelines related to some aspects of operational efficiency at airports. Other Annexes also include some relevant references to operational efficiency at airports such as Annexes 10 – Aeronautical Telecommunications, 12 – Search and Rescue, 16 – Environmental Protection and 17 - Security. The ICAO Airport Services Manual provides additional guidance for operational efficiency measures. ICAO documents are not however intended to exhaustively cover all aspects of airport operational efficiency as many aspects are specific to national airport operations. ICAO documents do provide guidance for airport operational efficiency where these standards and recommend practices are applicable to all international airports and have an impact on operational safety, such as emergency and maintenance services.

Airspace and Airfield

3.2 Aircraft are the primary users of an airport's terminal area airspace and airfield, including runways, taxiways and aprons. Operational efficiency measures are therefore related to the accommodation of, and services provided to, aircraft in terms of throughput capacity, holding delays, availability of direct routes and prevention of incidents. The secondary users of the airfield are aircraft ground service vehicles using the airport roads. The operational efficiency for airside vehicle traffic can be measured in delays which can occur at taxilane/taxiway intersections during busy periods if no grade separation is provided and if direct routes are not available. Airside vehicles include passenger, cargo and baggage transportation, as well as aircraft servicing vehicles such as catering, refueling, etc.

3.2.1 The operational efficiency of airspace management can be measured in traffic throughput and delays to aircraft while holding on the ground for a departure slot and in the air for an arrival slot. These factors will depend on the terminal area arrival and departure route structure, traffic origins and destinations, and operational procedures with regard to aircraft separations. The operational efficiency of an airport's airspace can also be affected by constraints imposed by military requirements and aircraft noise exposure restrictions.

3.2.2 The operational efficiency of an airfield system is also measured in traffic throughput and delays to aircraft ground operations. An example of a performance standard definition for measuring the delay, used for declaring practical or sustainable capacity, is an average aircraft delay of 5 minutes during busiest 4 hour period on the 30th busiest day. The delay is measured during the period on arrival from touchdown to gate docking, on departure from push-back to take-off. Aircraft delay on the ground can be caused by queuing on taxiways, holding for gates or runways, holding for bypassing aircraft on taxiway, long taxiway routings. Factors which affect the throughput of an airfield include:

- traffic characteristics - aircraft type mix
- operational procedures – runway allocation and taxi routings/distances
- runway configuration – number, alignment and separation
- runway availability - aircraft noise exposure, wind, visibility constraints
- taxiway configuration – availability of rapid exit and parallel taxiways
- gate allocation – number, size and location

3.2.3 The operational efficiency of airfield pavements can be affected by the presence of foreign objects which can cause damage to aircraft and surface contamination with friction reducing elements such as rubber, oil, dirt, snow and water. In addition to safety concerns, pavement surface irregularities can also cause damage to aircraft and poor riding quality.

Support and Emergency Services

3.3 Support and emergency services at an airport can be provided by various different agencies, both public and private. The services relate primarily to the accommodation, servicing and operational safety of aircraft. Support services also include utility services to the airport as a whole including water, power, communications, gas, etc.

Examples of the range of services for aircraft and their measure of operational efficiency include:

- Aircraft turn-around time – rapid aircraft servicing – passenger, baggage and cargo loading/unloading, fuel, catering, water, cleaning
- RFF vehicle response time – 2 (max 3) min to the end of each runway
- Emergency services effectiveness/preparedness – Emergency Plan and exercises
- Removal of disabled aircraft – Plan
- Handling of dangerous goods
- Secondary power supply maximum switch-over time
- Aircraft anti and de-icing holdover time
- Snow clearance and water removal from pavement surfaces
- Bird hazard control and reduction
- Preventive maintenance programme to ensure the required condition, performance and availability of infrastructure, facilities and equipment – i.e. lights serviceability, intensity, orientation and beam spread; clarity of markings; condition of pavements
- Airside ground movement control to avoid incidents between vehicles and aircraft

Passenger Terminal

3.4 Passenger terminal buildings are used by passengers, visitors and employees. ICAO requires that appropriate measures are adopted at international airports to permit passenger embarkation and disembarkation without delay. ICAO specifies performance standards for the processing of international arrival and departure passengers as follows:

- ICAO recommended practice is 60 minutes for international departure passenger processing from presentation at first processing point to the scheduled time of flight departure
- ICAO recommended practice is 45 minutes for international arrival passenger processing from disembarkation to completion of last clearance process

ICAO also specifies recommended practices related to transit stops, transfer connections, signage, walking distances, flight information display systems, public address systems, terminal landside access, security equipment, baggage handling, aircraft parking and servicing, etc.

3.4.1 Airports and airlines have developed additional performance standards for passenger and baggage processing, which in the absence of any related ICAO guidance material have not been endorsed by ICAO, but the following examples are provided for illustration purposes:

- Congestion – space standards ie 1 m²/pax for holding, 2 m²/pax for waiting & circulating
- Queuing Times – ie check-in 12 minutes during the 95th percentile busy hour
- Processing times – ie 2 min/pax for check-in, 20 sec/pax for departure passport control, 30 sec/pax for arrival passport control
- Delivery Times – ie arrival baggage claim – first bag/last bag
- Transfer connection times – ie 30 minutes
- Walking distances – less than 300 m between any two processors or travelator
- Level Changes – minimize and provide ramps instead of stairs/escalators/elevators
- Information Systems – clarity of FIDS, signage, public address
- Equipment reliability/performance

3.4.2 Passenger terminal buildings also serve aircraft in the provision of contact gates, stands on which aircraft are linked to the building by passenger loading bridges. Passengers embarking and disembarking aircraft at contact gates are provided with a higher level of service than passengers transported by bus to and from aircraft parked on remote stands. ICAO recommends the optimum allocation of aircraft parking stands as close as possible to the terminal building for rapid passenger loading and unloading. ICAO also recommends the provision of remote stands for aircraft parking when it is neither loading nor unloading to optimize the utilization of contact stands. Airports and airlines have operational standards related to the proportional split in the allocation of contact gates and remote stands. An example of a measure for the provision of contact gates can be that 80% of passengers during the busy hour should be accommodated by aircraft parked on contact stands.

Cargo Terminal

3.5 Cargo terminal buildings are used by freight and mail. Freight can include general cargo, express cargo, livestock, agricultural produce, other perishables, valuable goods, dangerous goods, etc. ICAO specify goals for the documentation requirements and processing procedures for cargo. In general, ICAO advocate the simplification of documentation, minimizing dwell time and expedition of clearance of cargo. An example of a recommended practice for the processing of import cargo is to release all general cargo within 4 hours from the time documentation is presented. ICAO also requires the safe storage and handling of dangerous goods.

Terminal Landside Ground Access

3.6 An airport's terminal landside ground access system can serve vehicle and rail, and in a few cases marine, transport modes. Vehicles can include private cars, taxis and buses. ICAO recommends that States ensure that rapid and reliable city/airport ground transportation is available. ICAO also have recommended practices related to the operational efficiency of ground access transportation, vehicle parking, off-airport check-in, etc. Examples of areas where operational efficiency can be measured in the provision of ground access transportation facilities and services are as follows:

Private Cars and Taxis

- Congestion – vehicle travel speed, employee shifts
- Travel time and distance
- Delay - Travel time allowance for unpredictable delay
- Terminal curb access capacity
- Parking space availability and convenience for access to terminal

Rail and Bus

- Service frequency and reliability
- Travel time
- Platform location and convenience for access to terminal
- Cabin space and comfort
- Baggage check-in and handling convenience

4 Regulating Airport Operational Efficiency

4.1 In addition to the paramount regulations related to airport operational safety stipulated in the ICAO Annexes and National regulations, States may also require regulations related to the efficiency of airport operations and provisions for their enforcement. This is required to ensure that the users – passengers and freight, and the customers – airlines, are provided with an operational efficiency at airports which meets State level of service and performance objectives. It is in the interest of airport operators, whether public or private, to provide efficient airport operations as this will have a beneficial impact on safety and financial performance as well. Instances can however exist when investment in new, expanded or improved infrastructure, facilities or equipment can be very costly. In these cases, due to conflicts of interest, it may be preferable for a stakeholder to delay such investment and this can result in operational efficiency deficiencies which is not in the interest of the user or the State.

4.2 ICAO specifies some operational efficiency standards and recommended practices for international airports, amongst others in the areas of safety and operational, emergency and maintenance services, in its international standards and recommended practices contained in Annexes and Manuals. In addition, States and airport operators will have additional regulations, criteria and standards related to airport operational efficiency. These should be reflected in national legislation, airport operating agreements and the following airport documents, where applicable:

- Airport Master Plan
- Airport Operations Manual
- Airport Maintenance Manual
- Airport Security Plan
- Airport Emergency Plan
- Disabled Aircraft Removal Plan

4.3 Regulation of airport operational efficiency however also requires methods for the legal enforcement of the standards and criteria. Provision for enforcement can be stipulated in national legislation and operating guidelines for the airport management authority. In the case of privatized airports, operational standards and criteria also need to be defined in the terms of reference and included in concession or sale contractual documentation. Enforcement by States that operational standards and criteria are maintained in accordance with ICAO and national regulations, and the requirements of concession contracts, can include the provision for the periodic certification of airports and the issuance of operating licenses.

4.4 ICAO is currently developing guidance material for airport certification and licensing related to operational safety. This should assist States to develop national procedures for airport inspection and monitoring procedures, as well as the issuance of airport operating licenses. Although airport certification will focus primarily on safety of airport operations, States may however also stipulate criteria and standards for operational efficiency in its requirements for airport facilities, services, operations and administration.

4.5 An airport should have defined level of service criteria and performance standards, and their evaluation methodology. These are used to establish practical capacities and to measure operational efficiency by observation and surveys under actual traffic conditions. The efficiency of emergency services can be evaluated through exercises of emergency plans. Operational efficiency deficiencies identified should be studied to develop corrective measures. These studies should include consultations between the state authority, airport, airlines and service providers. Operational efficiency deficiencies can be corrected using the following general methods:

- operational procedures – new and/or revised
- demand management – flight schedule co-ordination
- capacity enhancement - facility expansion

4.6 ICAO recommends that States whose international airports experience traffic peaking problems should, in accordance with appropriate procedures for coordination of schedules at airports, indicate to the appropriate airlines operating scheduled and non-scheduled flights, well in advance of the recognized traffic seasons, any restrictions which may apply in order to match the traffic and the airport capacity.

4.7 ICAO requires that States encourage consultations between the airport administration and airlines, control authorities and appropriate bodies representing other airport users and service providers at the earliest stage when planning new or modified facilities at their international airports. Facilities and services should be designed to provide the best possible airport traffic flow arrangements.

4.8 ICAO requires States to establish a National Air Transport Facilitation Programme with the objective to adopt all practicable measures to facilitate the movement of aircraft, passengers and cargo by removing unnecessary obstacles and delays. As part of this programme, Airport Facilitation Committees shall be established to co-ordinate facilitation activities between the State authorities, airport operators and airlines.

4.9 Future operational efficiency can be safeguarded through planning. Planning requires good forecasts of projected air traffic volumes and characteristics, including schedules and peak characteristics. Simulation testing can then be used to examine future scenarios of traffic and the provision of facilities and services.

5 Conclusion

5.1 It is in the interest of the States, airlines, airport operators and airport service providers, whether public or private, to provide efficient airport operations as this will have a beneficial impact on safety and financial performance as well. States therefore require regulations related to the efficiency of airport operations and provisions for their enforcement, in addition to the paramount regulations related to airport operational safety stipulated in the ICAO Annexes and National regulations. This is required to ensure that the users – passengers and freight, and the customers – airlines, are provided with an operational efficiency at airports which meets the level of service and performance standards of ICAO and the State.