MAIN REASONS FOR FLIGHT DELAYS

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ABSTRACT

The author considers one of the most topical issues in the field of air transportation – factors contributing to emergence of delays of flights. The author suggests analysis and classification of delays in the process of arrival and departure of flights and of the reasons that most often lead to a violation of regularity of flights. The concept of punctuality in the context of work of an airport and personnel according to a schedule is explored. The types of punctuality are suggested and analyzed from the point of view of timeliness of departure of flights, accuracy of arrival of flights, compliance with schedules of taking-off and landing. The method of calculation of all types of punctuality is given. The final part of the article assesses the international experience of monitoring of the regularity of air traffic of passenger aircrafts, airports and airlines.

Keywords: air transportation, airport, airline, flight, delay, punctuality, classification of delays, calculation of punctuality, slot.

Background. *Aviation transportation is a set of many operations, including a large number of processes and subprocesses at macro and micro levels. If at least one link in this complex fails, then with a high probability, the next flight may be delayed. In addition, the entire aviation industry as a whole is affected by a mass of factors that are not always manageable. Every year, because of delays in flights, many airlines around the world suffer material losses. In turn, passengers suffer tremendous inconveniences.*

Objective. *The objective of the author is to consider and classify main reasons for flight delays.*

Methods. *The author uses general scientific methods, comparative analysis, evaluation approach, mathematical apparatus, scientific description.*

Results.

Work done, have your delay

An air ticket of any passenger contains time of departure of a certain flight, on which he travels. But it is not always right to believe that the flight was delayed if the plane took off later than the time indicated on the ticket. Depending on the airline and the technology used by the service in preparing the aircraft for departure, departure time may be, for example, time for airstairs departure or time when an aircraft starts moving from a parking lot. Similarly with the time of arrival.

That is, flight time consists of time when the aircraft is directly in flight, as well as of time spent for taxi before departure and after landing. In other words, several stages can be distinguished during flight time. The first is departure time– beginning of movement of an aircraft on the thrust of its own engines from a parking lot or time of beginning of towing to the launching point with the aim of further taxiing and departure from the airport. Then the second stage is take-off time – when an aircraft starts to move along a runway to perform the flight. The third stage will be landing time of an aircraft on a runway of the airport of arrival. And, finally, the fourth stage – time of arrival – occupation by an aircraft performing a flight, a parking lot after landing at the airport of arrival [1].

Similarly, there are certain time limits for taxiing and towing an aircraft, for starting engines, which are individual for each type of aircraft on departure and arrival in accordance with the regulating documentation.

Each flight is performed at a special time for it according to the schedule within the dedicated time slot for this flight. Slot is time of departure or arrival for a particular type of aircraft on a specific date in the airport's schedule.

The whole list of departing and arriving flights per day forms a daily flight plan.

Unfavorable weather conditions can be considered as one of the main causes of delays. For take-off and landing, a relatively calm meteorological situation is needed in the airport zone. An aircraft equipped with the most modern instruments and systems will not always be able to land on a runway covered with ice, in absolute darkness or fog, in a strong thunderstorm with lightning, under incessant thunder or snow, with a sideways wind. Weather makes very often adjustments not only to the time of performing a single flight, it can paralyze the entire airport as a whole.

In addition to weather conditions, flight delays may occur due to the fault of the airline itself or the airport (service company). These reasons can be divided into technical and production (organizational).

Technical reasons are related to aircraft or airfield equipment malfunctions. Often, in the interest of flight safety, such delays are forced due to the need for mandatory post-flight or pre-flight maintenance of the aircraft by the engineer-aviation service (Daily Check, Weekly Check) accomplished in a short time, limited by the flight schedule.

Production causes are due to various factors. Delays due to the fault of the airport, for example, arise because of the large traffic of aircrafts on the apron or other reasons, i. e. forced waiting in parking for towing or taxiing operations. Delays also occur through the fault of service companies: late unloading/loading of kitchen equipment by the onboard cattering service, untimely provision of airfield special equipment (airstairs, towing tractors, transportation luggage carousels, de-icing machines, passenger buses, etc.), untimely discharge of operations of unloading/loading of luggage or mail.

Delays due to the fault of the airline can be related to both the absence of an aircraft for a given flight at the airport of departure (later arrival of the previous flight and the absence of reserve aircraft) and with the airline's departments: passenger transportation service (waiting for transfer passengers from delayed flights on arrival, failures of airport registration/boarding systems), engineering and aviation service (untimely or forced technical procedures).

In some cases, delays arise due to unforeseen circumstances and for reasons independent of anyone: death or severe deterioration of passenger's health; violation of public order, threatening aviation safety; natural phenomena in the airport zone.

To estimate the number of delayed flights there is a special value – punctuality with regard to the

schedule. It can be absolute and adjusted. Absolute punctuality is a ratio of departed or arrived flights in accordance with the time specified in the schedule, to the total number of actually departed or arrived flights for the reporting period expressed in percentage. Adjusted punctuality, unlike absolute, allows a fifteen-minute deviation to either side of the time in the schedule to calculate the ratio of the number of flights.

The evaluation of punctuality of flights is carried out by the following parameters:

– flight landing;
– flight arrival;
– flight departure;
– flight take-off.

Method for calculating punctuality

In the calculations, punctuality of flight departure can be represented as the ratio of the number of punctual departures to the total number of departed scheduled flights. This value is determined in percent. Punctuality of flight departure is a parameter that characterizes the airport.

In typical conditions, punctuality of flight departure (P_d) can be calculated by the formula:

$$P_d = \frac{N_{dp}}{N} \cdot 100\ \%, \qquad (1)$$

where N_{dp} – number of punctual flight departures; N – total number of flights departed.

Punctuality of flight arrival (P_t) is a parameter characterizing the activity of the airline. It can be represented in the form of the ratio of flights arriving punctually to the total number of flight arrived:

$$P_t = \frac{N_{tp}}{N} \cdot 100\ \%, \qquad (2)$$

where Nt_p – number of punctual flight departures; N – total number of flights departed.

Punctuality of take-off (P_r) is calculated as the ratio of the number of punctual take-off to the total number of flights departed, expressed as a percentage:

$$P_r = \frac{N_{rp}}{N} \cdot 100\ \%, \qquad (3)$$

where N_{rp} – number of punctual flight departures; N – total number of flights departed.

Punctuality of flight landing (P_p) is the ratio of punctual landings on a runway to the total number of landings made, expressed as a percentage:

$$P_p = \frac{N_{pp}}{N} \cdot 100\ \%, \qquad (4)$$

where N_{pp} – number of punctual flight departures; N – total number of flights departed.

It should be noted that if a delay in departure of a flight occurred for several reasons, then a culprit is:

– organization, through the fault of which the longest delay occurred;

– the first organization that allowed the delay the same length of delay in the departure of the flight.

All sorts of delays that can occur by someone else's fault correspond to a special code, which is a combination of a capital letter and a number (sequence number). For example [Russian language codes are quoted], И01 – a malfunction of an aircraft; Г02 – untimely refueling/discharge of fuel by the service provider; М09 – anti-icing treatment of an aircraft. These codes are contained in the classifier of violations of the regularity of flights of civil aircraft [2]. In this classifier, all delays are divided into structural units, because of which delays may occur.

A classifier of delays is also present in the AHM – Airport Handling Manual of the International Air Transport Association (IATA) [3]. Such code has in its composition a number (from 00 to 99) and an alphabetic part. For example, 14PO – resale, errors when booking; 13PE – errors in registration of passengers and / or baggage; 6OA – no free gates.

World experience of the struggle for regularity

The issue of regular flights and minimization of delays is relevant not only in Russia, it is of great importance in the entire global aviation community. All airlines are engaged in its study and take a variety of measures to minimize the possible costs and losses that may occur during the elimination of the consequences of disrupted regular flights in order to retain the largest segment of passengers in order not to lose their reputation.

In order to monitor the activities of airlines and companies providing air navigation, airport and other services for the transportation process, many international associations that unite air carriers periodically analyze the results of their work (for example, Association of European Airlines). The introduction of new advanced technologies, the exchange of experience with large enterprises, the maintenance of flight safety policies and control over its implementation, the development of certain rules and norms common for all participants are the main objectives of such associations.

In matters of ensuring and monitoring the regularity of flights, the evaluation criterion is punctuality of departures and arrivals. Abroad, the concepts of regularity for airports and airlines are commonly shared. This is the case, for example, in Europe. Departure time is the determining criterion for assessing the regularity of flights at the airport, and the arrival time to the airport will be the main indicator for the regularity of flights for an airline. It can be explained with a greater priority of the time of arrival at the final point of the route for the passenger than the time of departure according to the schedule. The analysis of the results of airports on the criterion of punctual departure is designed to coordinate the work of all airport and airline services, improve the technology of ground handling of aircraft and passengers, and to maximize the company's efforts to increase the regularity. For world leading aviation operators, the value of the regularity indicator is kept at the level of 90 %.

In our country, regularity statistics are kept exclusively with regard to air carriers, and lift off from the runway is considered to be the time of departure. While in some other countries departure time is calculated from the moment of departure of airstairs, as after that all other operations are deemed to be beyond influence of an airline. At this stage, the authority of airport services and air traffic management prevails, the work of which affects the regularity of the airport itself.

In Europe, there are other time intervals for determining delays. For example, an airline delay of 15 minutes is considered to be normal, and the flight is not considered delayed. The flight departure time and arrival time for the airport and airline, respectively, with an acceptable 15-minute delay is considered as timely arrival for calculating the punctuality of flights, this approach is used by the Association of European Airlines, besides aircrafts are classified as short-haul and long-haul aircrafts.

Conclusion. At present, there is no effective tool for increasing the punctuality of flights. An option

might be considered to develop a specific policy that would make usual delays a catastrophically unprofitable phenomenon for both the airline and the airport. To do this, it is necessary to increase the financial and organizational responsibility of the carrier to passengers. Such a policy will force promptly and optimally to solve all tasks related to planning and reserving.

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Article received 15.02.2018, revised 06.03.2018, accepted 18.03.2018.