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RESEARCH OF THE ROLE OF HANDLING COMPANIES IN PROVIDING SERVICES AT THE AIRPORT

The structure of the competitive field of the air transportation market consists of three main types of air transport companies: airlines, airports and ground handling operators.

A comparative analysis of domestic and foreign experience shows that there are significant differences in the principles of organization of airports. In the West, three organizations are clearly divided: airport operators (usually airports owned by government agencies), ground companies and airlines. In this case, the company providing groundhandling services may be independent or owned by the airport operator or airline. Strict rules for the division of airport management and ground handling activities have been formulated for ground employees belonging to airport operators.

At the same time, the ground industry is an independent part of the air transport industry, creating an independent competitive market. Therefore, stimulating the competitive environment of the emerging ground handling market should be a priority for the development of Ukraine's air transport industry.

According to the forecast of the International Civil Aviation Organization (ICAO), from 2000 to 2020 the total demand for air transportation will grow at an average annual rate of 4.5%. With this in mind, the world's aviation fleet has almost doubled. This means that by 2020 the planned volume of passengers will increase almost 2.7 times, and the volume of freight traffic will exceed this figure. However, the COVID-19 pandemic had a significant impact on aviation and air transport. Therefore, the main problems during the COVID-19 crisis and the resumption of the aviation industry require organized ground handling, which depends on flight safety, frequency of departures and airport capacity.

The article defines and formulates the essence of the concept of air handling, analyzes the services of ground handling of aircraft.

Key words: airport, ground service, aircraft service, air handling, vendor, airline.

Formulation of the problem. The organization of ground handling of the airport is an integral part of any international and domestic flights. Strict adherence to aircraft schedules and transportation costs are directly dependent on well-organized ground services.

In the world of aviation, there are organizations that consider technology and ground handling in places that consider the transition to aviation technology.

The airport usually serves many airlines that operate a certain distance from their technical base. Therefore, service companies provide ground services to airlines [1].

Due to the huge population, large cities and an ideal geographical location, so its air transport market is very high. The growing demand of the population for air transportation, as well as the restoration of space after the flood, will make it possible to use this

potential as a connection with the increase in passenger traffic at the airport.

This indicates the need to develop the activities of transport companies that provide a full range of ground handling services in the Ukrainian market [7].

As there are many airlines in the world, the choice of specialized aviation services requires healthy competition between processing and service companies. The right choice will help develop competition at airports, thereby improving the quality of services provided to passengers and airlines.

Analysis of recent research and publications. The methodological basis of the study were the works of domestic: Yu. F. Kulaiev, V.P. Iniushyn, O.M. Andronov, I.P. Sadlovskaaya and foreign scientists: O.N. Lee, E.L. Pin, H. Stanton, T. Saati instructive and normative documents of authorities, international conventions and directives in the field of airport activity.

Setting objectives. The aim of the scientific article is to analyze the approach to improving the quality of groundhandling services at airports, through the method of analysis of hierarchies reflected in the process of interaction between groundhandling service providers and airlines.

Presentation of the main research material. Ground handling at airports is one of the few activities in air transport in which airport services, airline divisions, and independent contractors jointly participate.

We do not have an official definition of the term "ground handling". It is a set of aircraft equipment and services for the commercial maintenance of aircraft, passengers and cargo, which we provide to airport operators, with the exception of managing the centralized infrastructure of the airport.

The structure of the types of works and services that create this complex of ground handling also does not have a single classification in the world industry.

Groundhandling service providers are organizations that directly support the platform. They are contractors and combine the experience and materials needed for ground operations at the airport.

As in any airport in the world, a handling company is engaged in passenger service. Each airport has its own, depending on which company the airport has signed a contract with.

As you know, ground handling services at Ukrainian airports are usually provided by handling companies. The activities of these companies directly affect the level of flight safety. This is due to a number of reasons related to the regulatory and organizational activities of these companies [2].

These companies are engaged in passenger service, as well as the service of the aircraft themselves.

Passenger services include: check-in procedures for passengers and luggage, transportation between the plane and the airport building, boarding / disembarking and escorting of passengers to the plane, passenger services with special needs (category UM, WH, etc.), ticket reservations related to registration of travel documents lost luggage, lost, discovered or damaged property of passengers, transport luggage left by passengers, and other services.

Aircraft services include: calculation of aircraft load centering and control, communication between

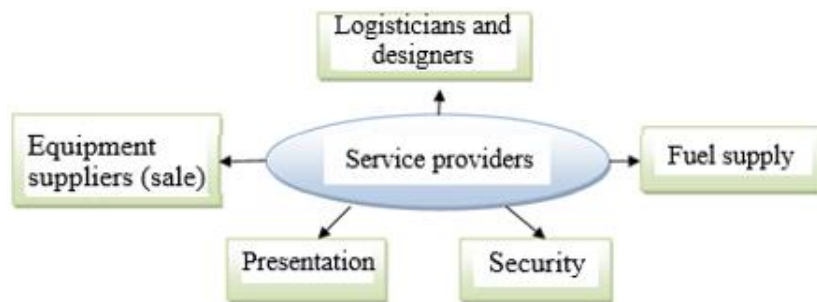


Fig. 1. List of ground handling services

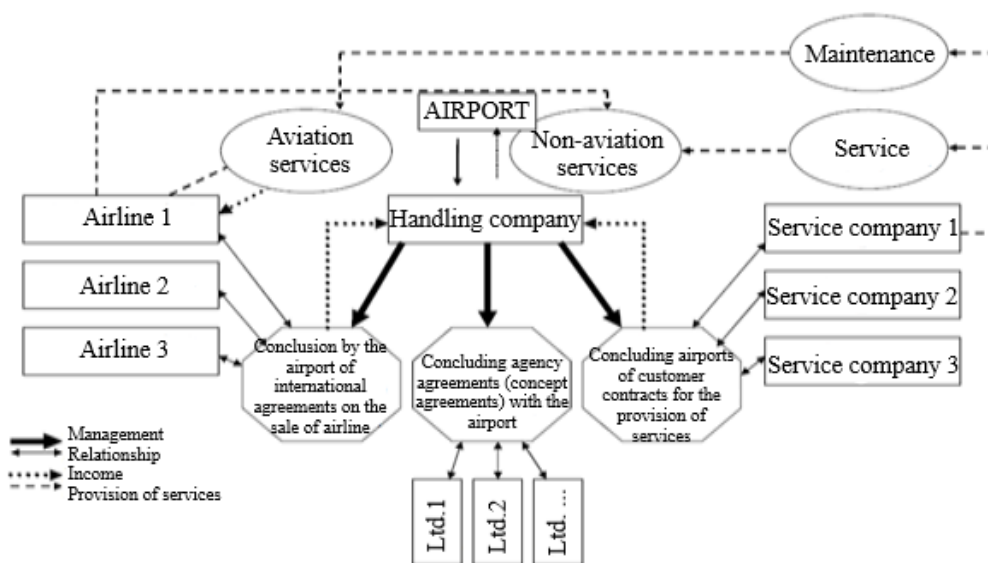


Fig. 2. The scheme of interaction of the handling company with the airline

aircraft berth and cabin, loading and unloading of aircraft baggage at the airport, transportation of cargo and mail, transportation of special ground equipment, internal cleaning of the aircraft and use of water supply services and aircraft maintenance for special ground equipment, aircraft towing, surface icing of aircraft, services using passenger ladders, ground power and transmitters, ground cooling and heating systems. Some service providers also provide line maintenance services that include system maintenance and line maintenance elements, such as tire and brake replacement, window replacement, and other ongoing aircraft maintenance.

It should be noted that aircraft ground maintenance (AIR) is a series of works performed by accepting an aircraft for parking in preparation for departure and departure.

Aircraft maintenance on the ground (ground service) is one of the important elements of safety and regular air transportation. Ground handling covers all types of services provided by aircraft at the aerodrome, in particular:

- meeting and post-flight inspection of the aircraft;
- provision of aircraft with ground power supply;
- loading and unloading of luggage by means of special transport and means;
- refueling with fuel and water;
- loading of onboard food;
- pre-flight inspection of the aircraft;
- ice removal and anti-ice treatment of aircraft;
- aircraft storage;
- towing of aircraft, etc.

In the process of ground handling of aircraft, non-compliance with safety requirements usually leads to incidents classified as aviation accidents, crashes or damage to ground aircraft. Such cases usually cause flight delays, cause serious inconvenience to passengers and companies, cause damage to airlines, and in some cases cause injury or even death.

At first glance, small accidents that occur during ground maintenance can seriously affect the safety of aircraft. For example, improper handling of aircraft against ice can result in ice getting into the engine and a fire in flight. Improper loading of the aircraft can lead to its overturning on the “tail”, and in other cases, even to the loss of control by the pilot over the aircraft.

According to the National Accident and Incident Investigation Agency (NBRCA), the number of accidents and damage to ground-related aircraft accounted for approximately 18% of all civil aircraft incidents in Ukraine.

According to the results of NBRCA investigations, most often events at ground handling occurs during

the loading and unloading of luggage, boarding and disembarking passengers and towing the aircraft.

The events taking place at the airports of Ukraine, as a rule, indicate shortcomings in the organization of handling companies. Investigations of events on the ground often reveal shortcomings in the training and experience of drivers, operators of special equipment and other specialists in ground maintenance of aircraft on the platform.

There are cases of damage to the aircraft due to non-compliance by ground personnel with the requirements of the governing documents, which regulate the procedure for carrying out specific work, insufficient level of standardization of handling companies and inconsistencies between ground handling personnel and aircraft crews.

It is worth noting that most often human and organizational factors contribute to the occurrence of aircraft damage and incidents during ground handling.

Many companies do not pay due attention to the assessment of the safety risk that may occur during ground handling. In 2013-2019, out of 31 events that occurred at airfields, 6 were not investigated at all. The investigation of one incident delegated to an airport entity has not been completed.

According to statistics, aviation accidents are rare during ground handling. Most of the incidents and damage to aircraft on the ground – the so-called low-level events. But such “minor” events can create a serious risk of airworthiness of the aircraft and should not be “unnoticed” or unregistered [1].

Nowadays, composite materials are widely used in the manufacture of aircraft, and although they have significant advantages, they still perform certain functions. Usually after the impact, the surface of the composite material returns to its original shape, and under it there is no visible visual damage. After an aircraft collides with another aircraft, equipment or airport equipment, routine roadworthiness tests may make it impossible to detect complex detachment at an early, hard-to-reach or “inconvenient” glider location. Therefore, even events such as “dents” or “paint damage” require the full attention of ground personnel.

Ground personnel must clearly understand that it is so important to report to the crew all incidents that occur during ground handling, even in the absence of obvious signs of damage to the aircraft. This applies to both the notification of the pilot-in-command and the notification of the national aviation accident investigation authority.

According to paragraph 1 of Article 119 of the Law of Ukraine on Aviation, all cases and damage

to aircraft must be subject to mandatory investigation in order to take measures to prevent future incidents.

Proper maintenance of the aircraft is a major factor in flight safety.

We believe that aircraft maintenance needs to be analyzed in more detail, as this is very important in ground-based aircraft maintenance.

Maintenance of commercial aircraft includes regular inspections of the technical condition of the aircraft, which must be conducted by the airline (maintenance organization) after a certain time or a certain hour (specified in the maintenance plan of the airline) [4].

There are the following types of checks: transit check, daily check, weekly check, A-check, B-check, C-check, D-check and SV (Shop visit). A-check and B-check [8]. Is a simple (easy) check, while C and D-check are a difficult form of maintenance. For some types of aircraft, the composition of the work included in the forms of maintenance is determined by the maintenance regulations, which are developed by the manufacturer in conjunction with representatives of the aviation authorities and representatives of operators. They all together they form working groups.

Transit check – the simplest form of maintenance performed before each departure of the aircraft, if the time after landing is less than three hours. If the next flight is scheduled more than three hours after landing, the Daily check is performed.

Daily Check – a daily check of the technical condition of the aircraft, which must be performed every 24 hours. In some cases, it can be performed after 36 hours. It is usually performed at night.

Weekly Check – performed approximately once a week. Can be performed both day and night. Does not require a room (hangar). It is usually performed in 3-4 hours [8].

A-check – this check is performed approximately once a month or every five hundred hours of flight: A1, A2, A4, A8. The higher the figure, the greater the amount of work. A-check is usually done at night in the airport hangar. The content of this test depends on the type of aircraft, the number of cycles or the number of flight hours since the last test. The inspection may be postponed by the airline depending on certain conditions [8].

B-check – this check is performed approximately every three months. It is also usually done at night in the airport hangar [8].

C-check – this form of maintenance is more complex than the previous ones and is performed every 15 – 24 months or 7500 hours of flight. Divided into

C1, C2, C4, C6 and C8. This test requires the aircraft to be decommissioned for a while (about two weeks) and requires a lot of space – usually in a large airport hangar. The timing of this inspection depends on many factors, including the type of aircraft. [8].

D-check is the most difficult form of aircraft maintenance. This test takes place approximately once every 12 years and lasts 30–40 days. During it all plane, all its knots and details are checked. Nodes that have produced a resource or have not been tested are subject to replacement. [8]. This inspection of the aircraft requires even more space and time than all the others, and is performed on the appropriate technical basis.

SV (Shop visit) – a difficult form of maintenance of the main engines of the aircraft. Frequency (average) – 12000 hours of flight.

Note that for more modern types of aircraft there is no single regulation, respectively, for a particular aircraft, the operator must develop a maintenance program based on guidelines, plant recommendations and instructions of the authorities (directives, bulletins, etc.).

The formation of forms of maintenance in this case should be engaged in the operator in accordance with their policies. Maintenance at night will be relevant when airlines operate only day flights. Night forms can be redistributed and medium-weight forms can be excluded (A-check). Since many plants have abandoned the letter numbering of forms, the name of the forms of maintenance is left to the discretion of operators (for example, LMV – line maintenance visit), but usually use the common [3].

There are additional services which include: performance of representative functions on serviced flights, service of postal and cargo air transportation, service of business aviation flights.

Some handling companies only service business aviation. These companies accompany and regulate the service of aircraft and passengers, taking into account the level of business class aircraft and VIP-flights performed on them. In the operation of regular flights and VIP-charters are governed by common to all rules of civil aviation. Aircraft ground service at airports provides: loading of onboard food, refueling the aircraft with water, fuel, parking in the hangar, cleaning the cabin. For passengers it is passport control and customs control, registration.

When servicing flights, business aviation companies that provide handling services take into account the specifics of the VIP-charter sector and private transportation. As business aircraft are not tied to the schedule, the handling agents provide opera-

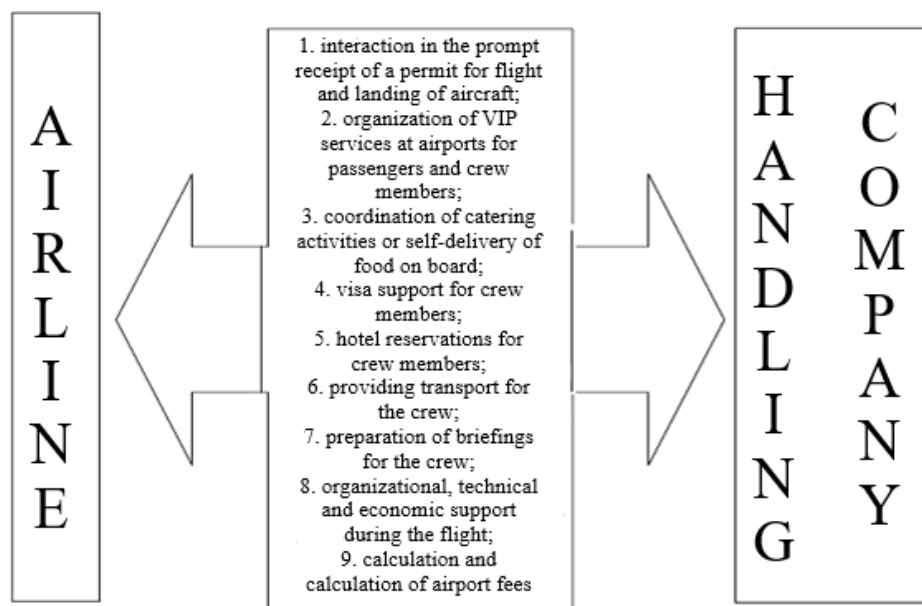


Fig. 3. Scheme of services of a handling company with an airline

tional training of aircraft, corresponding to possible changes in arrival / departure time, unexpected changes in the route.

The companies are also working to make operational changes to the aircraft maintenance schedule, to resolve the difficulties of communication between airport staff and English-speaking aircraft crews.

Agents offering handling services for business aviation control and coordinate almost all stages of aircraft and passenger service. The supervisor accompanies the flight at the stage of obtaining permits from Ukraine and foreign countries for the flight and landing of the aircraft along the route. The responsibilities of the handling agent include the prompt resolution of any issues and the organization of the necessary procedures to change the route and obtain the necessary permits.

In these handling companies there is an additional range of services. Handling companies can be contacted when it is necessary to book a hotel for crew members and to provide transportation for the crew or passengers of business flights. Catering coordination services are also provided or food delivery is offered on board.

The general requirements to the provider (evaluation criteria) of handling services are:

1. Ensuring aviation safety in accordance with the requirements of ICAO international standards.
2. Certification according to the activities of IATA, ISAGO (IATA Safety Audit for Ground Operations – IATA ground safety audit).
3. Certification by international industry certificates.
4. Certification of personnel by areas.

5. Certification of technological and technical means for providing services.

6. Certification according to ISO (International Organization for Standardization – International Organization for Standardization).

7. Experience with these types of aircraft.

The basis for making a decision at the “supplier selection” stage should be based on the audit report with conclusions and recommendations. On this basis, the final expert opinion is formed.

Expert assessment methods are widely used in decision-making under uncertain conditions or when comparing all the multiple attributes of the object without establishing a single selection criterion.

For the purposes of expert evaluation, as a rule, the 9-point scale (Fig. 4) proposed by Thomas Saati is considered [5].

According to the method of hierarchy analysis, the choice of service provider is substantiated:

1. Comparison of criteria (pairwise).
2. Comparison according to the selected criteria of service providers (pairwise).
3. Bringing the results to the general formula.

Example of comparison results according to selected criteria of service providers (pairwise) (Fig. 5).

The matrix of pairwise comparison of alternative vendors for ground handling at the airport contains the following task for expert evaluation:

1. Vendor A.
2. Vendor B.

Subsequently, a comparison of alternative vendors (suppliers) A and B of compliance with the require-

Intensity of relative importance, score	Definition	Explanation
1	Equal importance	The importance of objects (factors) A_i and A_j is the same
3	Moderate advantage of one over the other	Experience and judgment give a slight advantage of one object (factor) over another
5	Significant or strong advantage	The available data indicate a significant advantage of A_i over A_j
7	A very strong advantage is the advantage of the object (factor) A_i over A_j	Obviously
9	An absolute advantage	The obvious advantage of A_i over A_j is confirmed by all available features
2, 4, 6, 8	Interim decisions	Used in compromise cases

Fig. 4. Scale of ranking of the choice of vendors in air handling for service of flights at the airport by the method of expert evaluation

Criteria	№ 1	№ 2	№ 3	№ 4	№ 5	№ 6	№ 7	w^*	$w^* \text{ norms}$
№ 1	1	5	3	3	1/4	5	1/7	1,34	0,125
№ 2	1/5	1	1/3	1/3	1/6	1/3	1/7	0,29	0,027
№ 3	1/3	3	1	1	1/4	3	1/7	0,72	0,067
№ 4	1/3	3	1	1	1/5	2	1/7	0,68	0,063
№ 5	4	6	4	5	1	8	2	3,58	0,334
№ 6	1/5	3	1/3	1/2	1/8	1	1/8	0,40	0,037
№ 7	7	7	7	7	1/2	8	1	3,70	0,345
The sum of the elements in the columns	13,06	28	16,67	17,83	2,49	27,33	3,69	10,71	

Fig. 5. Matrix of comparison according to the selected criteria of air handling vendors for service of flights at the airport by the method of expert evaluation

w^* – components of the personal vector of T. Saati's own matrix, according to the maximum values;
 $w^* \text{ norms}$ – criteria for normalization of the considered factors, reduced to one.

Service providers	Supplier A	Supplier B	$w^*(1)$	$w^* \text{ norms}(1)$
Supplier A	1	1/9	0,33	0,029
Supplier B	9	1	3	0,270
The sum of the elements in the columns	10	1,11	11,11	

Fig. 6. Matrix of pairwise comparisons of alternative vendors for aviation security

ments of international standards to the service provider at the airport. Consider the example of aviation security (Fig. 6).

Similar standards are set for other groundhandling service providers.

Next, it is necessary to synthesize the final solution. Among them, the last step is the operation of weighing the normalized eigenvectors of standard alternatives, which are obtained using priority tasks

and included in the personal vector of the standard matrix.

Decision support systems (DSS) are used for decision-making tasks.

Conclusions. Handling companies play a very important role in the life of any airport.

We believe that an example of the most complete classification is Directive 96/67 / EC – the main document of the jurisdictional rules of the European Union,

which contains 11 activities that create this complex. These are the following activities: supervision and control; passenger services; baggage handling by freight and postal services; platform services; commercial maintenance of aircraft; refueling aircraft; aircraft maintenance; crew management; transportation from the airport; food for landing [6].

As a rule, groundhandling operators, mainly airlines, airports and specialized companies, have not completed the full list of tasks, mainly due to their diversity and various organizational forms, with a focus on general functions. Business process.

Thanks to these companies, the airport receives income from the aviation segment and receives stable and well-established operations in its terminals and on the platform.

DSS “Choice” – an analytical system based on the method of analysis of hierarchies.

The conducted researches allowed to draw the following conclusions:

1. The use of this method allows in the first stage to consider seven key criteria without the influence of the weights of specific service providers. The most important criteria for decision making are criteria № 5 and № 7 (Fig. 5).

2. It helps auditors to apply weighting factors not only in making specific decisions, but also in the future to address shortcomings in certain indicators, in particular, in the formation of recommendations. In our case, the supplier B by criterion № 5 (Fig. 5).

3. This approach is transparent and significantly simplifies the tender procedure among vendors for ground handling of aircraft, which allows to form objective decision-making criteria and increase the objectivity of the assessment.

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Валько А.М., Суворова Н.О. ДОСЛІДЖЕННЯ РОЛІ ХЕНДЛІНГОВИХ КОМПАНІЙ У ЗАБЕЗПЕЧЕННІ ПРОЦЕСІВ ОБСЛУГОВУВАННЯ В АЕРОПОРТУ

Структура конкурентного сегменту авіатранспортного ринку утворюється трьома основними типами підприємств повітряного транспорту – авіакомпаніями, аеропортами і операторами з наземного обслуговування авіап перевезень.

Порівняльний аналіз зарубіжного і вітчизняного досвіду показав істотні відмінності в принципах організації діяльності аеропорту. На заході досить чітко розділено три суб'єкта: оператор аеропорту (зазвичай аеропорт належить державним структурам) компанії, надаючи послуги з наземного обслуговування і авіакомпанії. При цьому компанії, надаючи послуги з наземного обслуговування, можуть бути як незалежними, так і належати операторові аеропорту або авіакомпанії. В разі приналежності агента з наземного обслуговування операторові аеропорту встановлені строгі правила розділення бізнесу з управління аеропортом і діяльністю по наземному обслуговуванню.

При цьому галузь наземного обслуговування авіап перевезень є самостійним компонентом галузі повітряного транспорту, який створює окремий конкурентний ринок. Відповідно, стимулювання конкурентного середовища на ринку наземного обслуговування, що формується, має бути пріоритетним напрямом розвитку галузі повітряного транспорту України.

Згідно з прогнозом Міжнародної організації цивільної авіації (ІКАО) у період з 2000 по 2020 рік загальний попит на повітряні перевезення в середньому щороку мав би зростати на 4,5 відсотка. З урахуванням цього світовий парк повітряних суден майже вдвічі мав збільшитися. Це означало, що у період до 2020 року обсяг пасажирських повітряних перевезень планувався збільшитися майже

в 2,7 рази, а обсяг вантажних перевезень – перевищити цей показник. Але пандемія COVID-19 має великий вплив на авіацію та авіаперевезення. Таким чином, головною проблемою під час кризи COVID-19 і перезапуску галузі потрібно організоване наземне обслуговування, від якого залежить безпека польотів, частота відправлень ПС і пропускна здатність аеропортів.

У статті визначено та сформульовано сутність поняття авіахендлінг, проведено аналіз послуг з наземного обслуговування повітряних суден.

Ключові слова: аеропорт, наземне обслуговування, обслуговування повітряних суден, авіахендлінг, вендор, авіакомпанія.