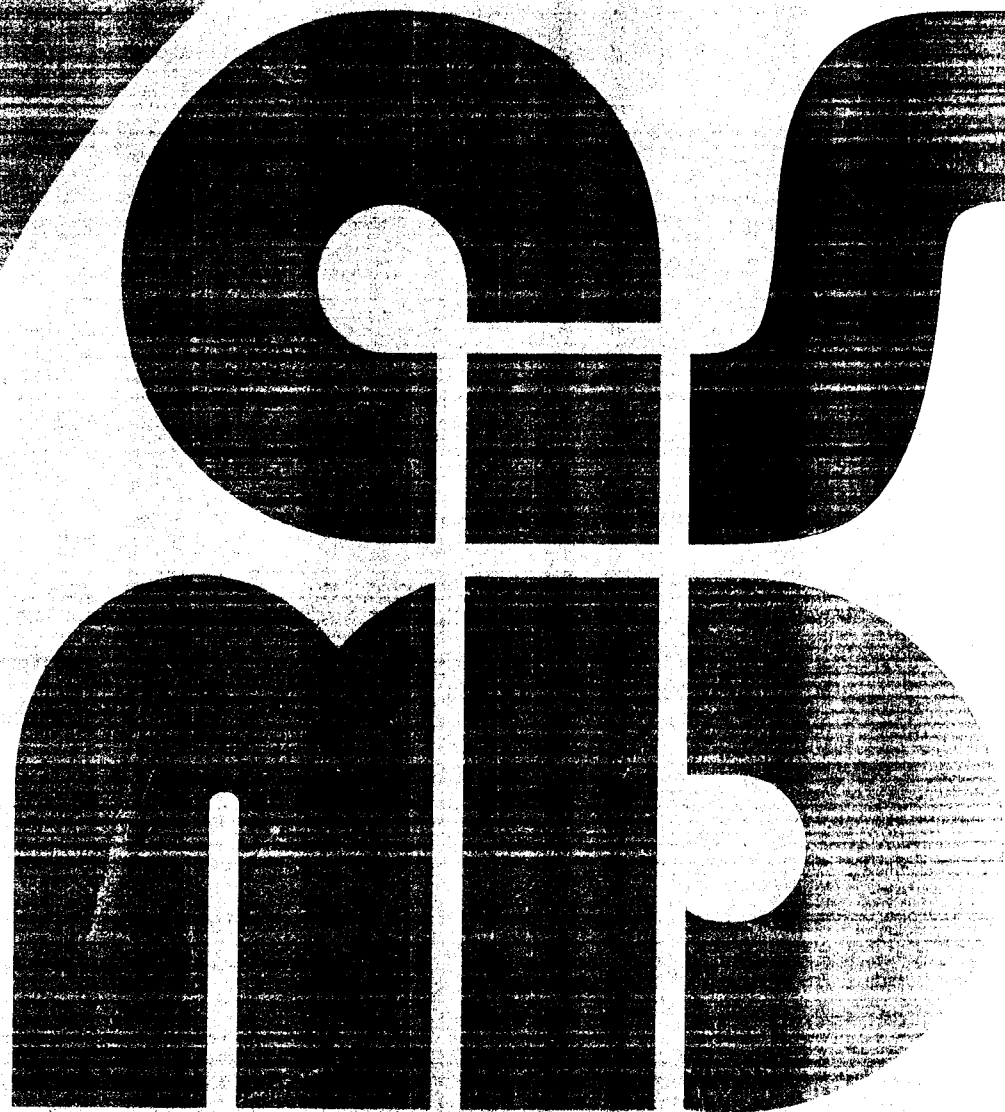


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To Our Readers

This Journal, the Scientific Letters of Academic Society of Michal Baludansky has been conceived by the founders of Academic Society of Michal Baludansky as a printed platform for exchanging knowledge between university scholars and experts from different countries who take a keen interest and activities of the outstanding scientist, educator and statesman Michal Baludansky.

Шановний читачу,

пропонований журнал «Scientific Letters of Academic Society of Michal Baludansky» задуманий засновниками Академічного співтовариства Михайла Балудянського як друкування видання з обміну знань між вченими і фахівцями університетів різних країн, що мають безпосереднє відношення до життя і діяльності видатного вченого, педагога і державного діяча Михайла Балудянського.

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LOGISTICS FLOW MANAGEMENT STRATEGY THROUGH THE CREATION OF AN AVIATION TERMINAL-HUB IN UKRAINE

Annotation

The article is devoted to the possibility of creating a hub airport or a hub terminal on the territory of Ukraine.

It should be noted that the hub airport is an airport that is used by an airline or airline alliance as a point of transfer of passengers and has a high percentage of connecting flights. Often the airline hub is located at its base airport, or at the airport of the same city as the main office. Airlines can use either one or several hub airports. They are used in both passenger and freight traffic.

A comparative analysis of the volume of passenger traffic in the world's largest airports, as well as airports in Ukraine, was conducted. It was concluded that the airport in Kiev Borispil is the most successful and optimal for improving it to the level of the hub airport.

As the basic airline, it is most optimal to consider the International Airlines of Ukraine. Since this company has the largest fleet of aircraft, a wide geographical coverage of the flights, its own facilities for carrying out a linear and basic maintenance, as well as it is based on the territory of the "Boryspil" airport.

It was determined that based on the structure of the expected for the role of a junction airport, the most optimal is the conversion of terminal D into a terminal-hub. It can serve for transfers: from international to international flights, from international to domestic, from domestic to domestic, from domestic to international, as well as to flights to the final points of the route.

It should also be noted that the attractiveness of "Boryspil" as a hub can be increased by reducing airport fees, attracting new airline partners by Ukraine International Airlines, and by improving the airport infrastructure.

As a result of the article, it was determined that the most effective schemes of passenger traffic for the hub in "Boryspil" could be either the "Hourglass"-model or "Coverage zone"-model.

Keywords: airport-hub; passenger; traffic; cargo; transit; transportations; airplane

Ремига Юлія, Кожохіна Олена

СТРАТЕГІЯ УПРАВЛІННЯ ЛОГІСТИЧНИМ ПОТОКОМ ЗА ДОПОМОГОЮ СТВОРЕННЯ АВІАЦІЙНОГО ТЕРМІНАЛ-ХАБУ В УКРАЇНІ

Анотація

Стаття присвячена можливості створення на території України вузлового аеропорту або терміналу-хабу.

Слід зазначити, що вузловий аеропорт - це аеропорт, який використовується авіакомпанією або альянсом авіакомпаній як пункт пересадки пасажирів і має високий відсоток стикувальних рейсів. Часто хаб авіакомпанії розташовується в її базовому аеропорту, або в аеропорту того ж міста, що і головний офіс. Авіакомпанії можуть використовувати як один, так і кілька вузлових аеропортів. Вони використовуються і в пасажирських, і в вантажних перевезеннях.

Був проведений порівняльний аналіз обсягів пасажирських перевезень в найбільших світових аеропортах, а так же аеропортах України. Був зроблений висновок, що аеропорт Київ Бориспіль являється найбільш успішним і оптимальним для удосконалення його до рівня вузлового аеропорту.

В якості базової авіакомпанії найбільш оптимально розглядати Міжнародні Авіалінії України. Так як дана компанія володіє найбільшим парком літаків, широким географічним покриттям виконуваних рейсів, власними потужностями проведення лінійного і базового ТО, а так само базується на території аеропорту Бориспіль.

Було визначено, що виходячи зі структури передполаганого на роль узлового аеропорту найбільш оптимальним є перетворення терміналу D в термінал-хаб. Він може служити для пересадок: з міжнародних на міжнародні рейси, з міжнародних на внутрішні, з внутрішніх на внутрішні, з внутрішніх на міжнародні, а так само на рейси в кінцеві точки маршруту.

Слід так само відзначити, що привабливість Борисполя в якості вузлового аеропорту може бути збільшена шляхом зниження зборів аеропорту, залучення Міжнародними Авіалініями України нових авіакомпаній партнерів, а так само шляхом поліпшення інфраструктури аеропорту.

В результаті дослідження було визначено, що найбільш ефективними схемами пасажиропотоку для хаба в Борисполі може стати або модель «Пісочний годинник», або ж модель «Зони покриття».

Ключові слова: аеропорт-хаб; пасажир; трафік; вантаж; транзит; перевезення; літак

1. Introduction

For the effective management of logistics flows in the world, the tendency of using nodal airports to redistribute flows has become popular for a long time. The nodal airport (hub) is an airport used by the airline or alliance of airlines as a point of passengers transfer and has a high percentage of docking flights. They are used in passenger and cargo transportations.

There are no such airports in Ukraine, but there are all the prerequisites for its implementation. To do this, it needs to determine who will take the initiative and become the first in the country.

Consider the basic preconditions for the establishment of an airport-hub and how much such a project will be effective in the Ukrainian market.

2. Presentation of main material

The airport-hub in the aviation business is defined as “a specially developed network of routes, with traffic inside which two points are connected not directly, but through a central point, called a hub” [7].

The airport-hub is the point of destination where some passengers (cargoes) are heading in order to make an intermediate stop there and, by changing an aircraft to another of the same airline or alliance of airlines, to continue its flight to the final point of destination, since the departure point of their departure is not related to a direct flight with a destination. The airport-hubs offer better service, more points of destinations and more frequent flying than airports that provide transportation only from “point-to-point”.

The general preconditions for the establishment of the airport-hub (Figure 1), which need to be addressed, are to make a decision on the formation of an airport with a hub status on the territory of Ukraine (Figure 2). Of course, these stages are rather generalized and mean the practical side of the question, why a detailed analysis of key indicators based on real numbers should be preceded and will confirm the possibility of further consideration of a project of this magnitude.

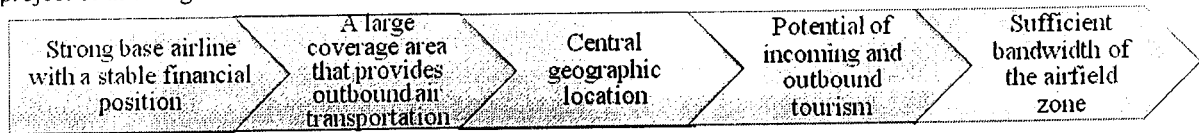


Figure 1. The main prerequisites for the creation of an airport-hub

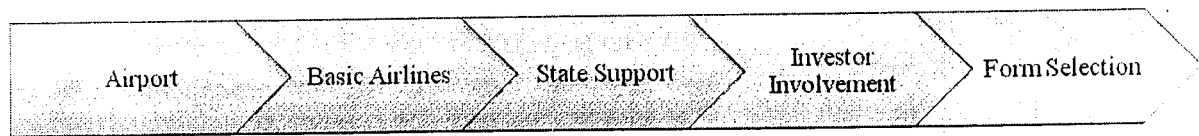


Figure 2. The main elements of decision making

Choice of an airport

The concept of the hub development is based on the fact that an airport, which is a natural monopolist, becomes an interconnected link of the ground transport system with aviation transport (most often it is competing airlines), as well as a link for domestic and international flights, in a separate significant territory across the region. Such airports become the subject of state concern and the area of the profitable state and private investment, their economic status is under the auspices of the domestic and foreign policy of the state.

In Ukraine, while we can talk about the stable operation of only one airport – “Boryspil”. Of course, it has the most privileged position among other airline companies in Ukraine. “Boryspil” is the first of all enterprises in Ukraine received a loan of \$ 15.1 million for reconstruction from the EBRD jointly with Ukrainian banks in July, 1993. The reconstruction project envisaged a complete re-equipment of the existing terminal building (terminal “B”) and the construction of a new terminal “A”. Within 14 months the reconstruction has been completed [6].

Regarding the current state of this airport, it should be noted that “Boryspil” airport is among the top three Eastern European leaders in passenger traffic according to the rating of the British research agency Sky Trax after the Budapest and Tallinn airports [2].

It should also be noted that in recent years there has been a steady increase in passenger turnover at “Boryspil” airport (Figure 3).

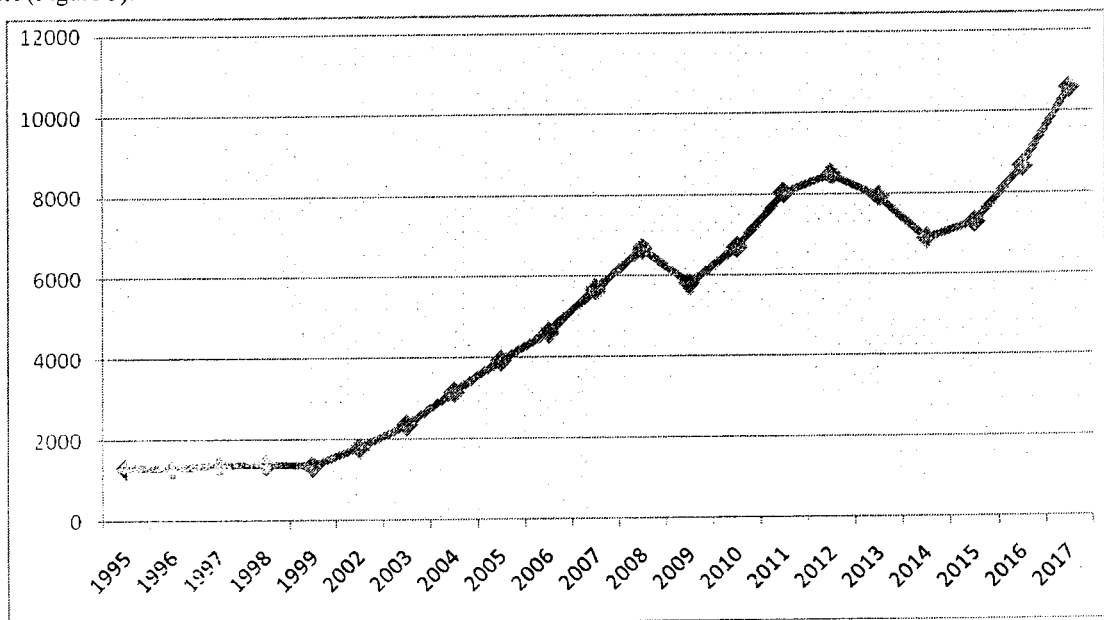


Figure 3. The volumes of passengers traffic of the “Boryspil” airport

Contrary to the opinion of some officials, the creation of an airport hub does not mean that the volumes of air transportation will grow by themselves. There are many cases in which investors believed that the built infrastructure would in fact itself stimulate the growth of air travel, but their expectations did not materialize. One such example is St. Louis Downtown Airport (Missouri, USA), about 4 hours by car from Chicago. It has two runways capable of receiving long-haul aircraft, but not used by any of the major American air carriers.

But the example of the Tucumán airport in Panama suggests that even small airports with the number of air travelers about 6 million people can be strong hubs.

Particular attention should be paid to extremely favorable geographic location. It needs to mention that the most famous trade routes have always been through Ukraine. Now there is a unique opportunity to re-use this state of affairs since the planned hub could become a transit point between such forward-looking destinations as Europe-Asia and China-Europe.

According to forecasts of the airline market development by the Boeing Corporation, in 20 years the volume of air transportation between Asia and Europe will increase from the current 3.7 million tons to 12 million tons. Transit to China - Europe will grow by 45% by 2020 from 11.7 million 20-foot containers to 17 million. According to experts, Ukraine in this volume can attract about 20% of cargo traffic [5].

Consider the largest passenger airports in the world and companies with bases in its territory (Table 1) [3] and compare them with biggest Ukrainian airport (see Table 2) we can conclude that Kyiv Boryspil International Airport the most successful and suitable for the airport hub role.

Table 1. The largest passenger airports in the world

No	City	Airport	Country	Base airlines	Passengers per year (thousands)
1.	Atlanta	Hartsfield Int'l	USA	Delta Air Lines, ExpressJet, Republic Airlines, SkyWest Airlines	101 491
2.	Beijing	Capital	China	Air China, Capital Airlines, China Southern Airlines, China Xinhua Airlines, Hainan Airlines, Shandong Airlines	89 939
3.	Dubai	International	UAE	Biman Bangladesh Airlines, Eastern SkyJets, Emirates, Flydubai, Iran Aseman Airlines, Qantas, Royal Jet, Safi Airways	78 010
4.	Chicago	O'Hare International	USA	American Airlines, Envoy Air, GoJet Airlines, SkyWest Airlines, Trans States Airlines, United Airlines	76 950
5.	Tokyo	Haneda International	Japan	Air Do, All Nippon Airways, Ibex Airlines, Japan Airlines - JAL, Skymark Airlines, Solaseed Air, Star Flyer	75 317
6.	London	Heathrow	Great Britain	British Airways, Virgin Atlantic Airways	74 990
7.	Los Angeles	International	USA	Alaska Airlines, Allegiant Air, American Airlines, Compass Airlines, Delta Air Lines, Envoy Air, Horizon Air, SkyWest Airlines, United Airlines, Virgin America	74 937
8.	Hong Kong	International	Hong Kong	Cathay Dragon, Cathay Pacific, HK Express, Hong Kong Airlines	68 283
9.	Paris	Charles de Gaulle	France	Air France, Delta Air Lines, XL Airways France	65 767
10.	Dallas/ Fort Worth	Dallas Fort Worth International Airport	USA	American Airlines, Envoy Air, ExpressJet	64 072
11.	Istanbul	Ataturk International	Turkey	Atlasglobal, Free Bird Airlines, Onur Air, Turkish Airlines	61 837
12.	Frankfurt	International	German	Condor Flugdienst, Lufthansa, Lufthansa CityLine, PrivatAir, SunExpress Germany	61 032
13.	Shanghai	Pudong Int'l	China	Air China, China Eastern Airlines, Juneyao Airlines, Shanghai Airlines, Spring Airlines	60 053
14.	Amsterdam	Schiphol	Netherlands	Corendon Dutch Airlines, Delta Air Lines, KLM cityhopper, KLM Royal Dutch Airlines, Transavia Airlines, TUI Airlines Netherlands	58 285
15.	New York	JFK	USA	American Airlines, Delta Air Lines, Eastern Air Lines, Endeavor Air, Envoy Air, JetBlue Airways	56 827

Thus, it can be argued that "Boryspil" has significant potential in order to provide the necessary indicators of transportation attraction on its part.

Table 2. The largest passenger airports in Ukraine

№	City	Airport	Base airlines	Passengers per year (thousands)
1.	Kyiv	Kyiv Boryspil International Airport	Aero-Charter, Aerostar, Azur Air Ukraine, Bravo Airways, Business Aviation Center, Challenge Aero, KhorsAircompany, Mars RK, Ukraine International Airlines, Windrose	10 554
2.	Kyiv	Kyiv International Airport Zhylyany	Aero-Charter, Aerostar, Anda Air, Aviatrans K, Bravo Airways, Business Aviation Center, Challenge Aero, DART Ukrainian Airlines, KhorsAircompany, Motor Sich Airlines, UM Air, Vega Air Company, YanAir	2318
3.	Odessa	Odessa International Airport	Dniproavia, Ukraine International Airlines	949,1
4.	Lviv	LvivDanylaHalytsky International Airport	Atlasjet Ukraine, Dniproavia, Ukraine International Airlines	43,2

Availability of the basic airline

It should be noted that special conditions apply to companies based at the airport because they provide a stable share of income. Hub can provide a number of benefits to such airlines. For example, Lufthansa air taxi pays Frankfurt Airport is 5 times less than "Ukraine International Airline" (UIA) "Boryspil" airport. Thanks to such privileges airlines reduce their tariffs and increase the flow of passengers and cargo, and therefore, the inflow of funds to the budget, which then goes to investment in the airport. It is in such civilized countries that there is a financial mechanism for interaction between the state, airlines and the airport.

There are three ways of the possible development of the airport-hub:

- 1) dynamic development, caused by the growth of the airport coverage area for a certain time;
- 2) development by the airline (airlines) when the carrier decides to create an airport-hub with a good geographical location sufficient to expand the area and the reasonable cost structure (for example, Charlotte Airport (USA) established by the US Airways carrier);
- 3) artificial development, when investors decide to invest significant funds simultaneously in the development of the airport and the airline (for example, Dubai in the UAE).

Most large hubs are developed by home carriers, which are often national and carriers at the same time. For example, Frankfurt and Munich developed by the Lufthansa, Zurich - SWISS, London - Heathrow - British Airways, Amsterdam - KLM Royal Dutch Airlines, Tucuman - COPA, etc.

Thus, a prerequisite for the establishment of an airport-hub is a strong home-based carrier with a stable financial position. At the same time, the airport itself can begin to implement the hub strategy, convincing the airline to base its own several aircraft. This will allow performing early morning and late evening flights with aircraft based at night. Such a development will create the first two blocks (morning and evening peak hours) and will require the availability of a database of technical servicing, warehouses, offices, etc.

By coordinating the development strategies of the airport and the airline, it can jointly develop docking flights to some destinations - and the airport is already on the way to the hub. However, it should be emphasized once again that not every airport can be developed in this way - as long as there is no "generous" sponsor.

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Thus, the airport cannot create a hub independently but can develop a hub strategy by encouraging appropriate carriers to collaborate on developing and implementing a hybrid hub strategy.

After the Aerosvit bankruptcy, most of the appointments were received by the Ukrainian International Airlines (UIA) [4]. Thus, in Ukraine, there was a strong base carrier, which connected the route network of Western Europe with the countries of the CIS, Southeast Asia, and the Persian Gulf.

Back in 1992, Ukraine International was co-founded as an international carrier of independent Ukraine by the Ukrainian State Association of Civil Aviation and GPA (thereafter AerCap B.V.), the world's largest aircraft lessor.

Over the 15-year period, the airline has attracted top class strategic and financial investors. In 1995, the Ukrainian Government shareholding was transferred to the State Property Fund. In 1996, Austrian Airlines and Swissair became shareholders with the European Bank for Reconstruction and Development, EBRD, joining shortly -- in 2000 [4].

Organizational model of a public-private entity empowered UIA to take advantage of the strengths of all shareholders, to seize a vast selection of business opportunities, as well as to adopt the best maintenance, operation, service, and management practices of its international partners.

Initially, UIA was meant to establish non-stop operations between Ukraine and Western Europe and successfully implement the strategy of a point-to-point carrier.

By its 18th anniversary in 2009, UIA became one of Ukraine's key aviation market players with 20% business segment. However, further, development required the UIA business strategy revision. The latter coincided with the change of the company's ownership in 2010 and was triggered by international investors' withdrawal from the equity fueled by the shift in their market strategies in Ukraine and expiration of the EBRD investment conventional participation period [4].

Amid challenging operating environment and intense price-based competition, privatization guaranteed the UIA business flexibility and allowed commencing transformation from a point-to-point into a network carrier.

In 2013, following the business collapse of the main competitor, UIA turned out to be the sole carrier capable of averting market infrastructure collapse. The transition process turned out to be much more dynamic than it had been planned initially. Over twelve months, UIA had to boost operations by doubling fleet and enhancing the team. The latter empowered the airline to resume operations to most destinations “inherited” from the competitor carrier [4].

Involuntary expansion jump-started the UIA operations’ optimization and prioritized the development of Ukraine’s transit potential. UIA built up its operations so as to generate and direct transit passenger traffic from the North to the South and from West to the East via its hub, Kiev Boryspil International Airport.

In 2014, UIA faced the challenge of stabilizing its business amid profound political and economic crisis, devaluation of the national currency, and dramatic decline in effective demand [4]. For the first time ever, UIA had to take drastic contingency measures and optimize its staff, fleet, and route network.

Meantime, to sustain the business and guarantee passengers the service availability, the UIA Management Team decided to modify the operating model and commence systematically decreasing fares by excluding additional services from the ticket price. Eventually, the latter empowered UIA to offer clients competitive fares and become the world’s first network low-fare carrier.

Today Ukraine International is Ukraine’s strategic aviation business. UIA is a low-fare network carrier. Its core businesses are passenger and cargo transportation.

Ukraine International offers a vast selection of point-to-point and transit travel opportunities. The airline connects Ukraine with 38 countries in Europe, Asia, America, Africa, and the Middle East. The carrier operates 1100 international and domestic flights weekly and provides connections with partner airlines’ services to over 3000 destinations worldwide.

Kiev Boryspil International Airport, KBP, is the UIA base hub.

Ukraine International Airlines’ fleet consists of 43 modern airliners: 1 wide-body long-haul Boeing 777-200ER aircraft, 4 long-haul Boeing 767-300ER, 27 medium-haul New Generation Boeing 737, as well as 6 medium-haul classical Boeing 737, and 5 medium-haul Embraer-190.

Ukrainian hospitality, modern fleet, internationally trained and certified crew as well as ground personnel, ensure that UIA competes successfully on international markets.

UIA holds a handling network. The latter empowers the carrier to closely monitor service quality, sell handling services to other airlines, and generate more employment opportunities in Ukraine.

By 2021, UIA plans to actively enhance and renew fleet, expand Eastern and South-eastern route networks, increase frequencies of westbound flights, as well as further develop transit potential of Kiev Boryspil International airport and regional hubs in the cities of Ukraine.

The interest of the state and the need for investors with international experience

It should be noted that the government’s interest in implementing such a project is also a key point. The state puts money into a hub, developing its infrastructure, ground transport communications, and systematically creating a network of local airlines linking a hub with a fairly large region. The airport becomes not only a landing site but also a high-class center of diverse services.

Thus, in the market for airline services, airports, first of all, compete for the passenger, and competition between airlines in the background of this struggle goes to the background. This trend is also observed in the direction of freight traffic.

The Ukrainian government is showing interest in the creation of an airport-hub, with more than one attempts to move in this direction towards “Boryspil”, but concrete actions have not been practiced. Of course, it will be more convenient for the state to run runways, which should be allocated if they are in its ownership, but this mainly concerns regional airports. That is why it is urgent to attract investors to implement an investment.

To implement projects of this kind, a strategic partner can sometimes play a key role. For example, during the Second World War Subic Bay in the Philippines was a US military base. FedEx needed a foothold in this region of the world, therefore turned the military base into a hub. This place has become the largest hub, FedEx’s aircraft use it as a transit point before departing to the Far East, Europe or the United States. If there is a strategically important place, then international carriers will pay attention to it. They are always in search of advantageous places. They will come if the airport is in a rocky place and justifies its location from the economic and transport-logistics point of view.

Hub-terminal

Of course, it’s still too early to talk about making a hub for the entire “Boryspil”. It is believed that the structure of this airport is not quite optimal for such purposes since it is rather uncomfortable to carry passengers and transfer the goods from one terminal to another, such operations can take up to several hours. Planning is virtually impossible to change and will require investments that are far greater than those currently under discussion.

The main proposition for the operator-investor is now the use of the Terminal D as a hub, especially since it is there that all flights of the potential UIA main airline are transmitted.

According to the situation, it can be argued that for future prospective carriers companies there is a choice of two main options (see Figure 4), which in their essence are mutually exclusive and will fundamentally distinguish the further course of implementation.

When making decisions about any of the options should also be noted that in choosing the first option, the airline may take the almost monopolistic position on other international carriers, but this way usually requires considerable effort.

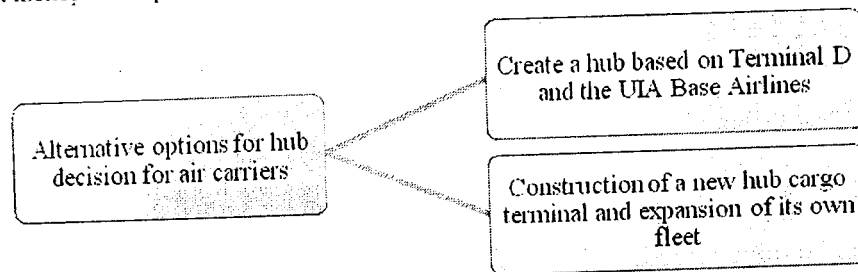


Figure 4. Alternative options for airline companies regarding the hub terminal

If it chooses the second option, then it will save more autonomy, as well as develop the project, based on already developed algorithms that have been used for other countries, which greatly facilitates the implementation process.

Choosing the appropriate coverage scheme

It should be noted that hub airports can combine several market segments, each of which has its own docking potential.

For example, an international hub can offer connecting passengers a transfer of the following segments [8]:

- from international to international flights;
- from international to domestic flights;
- from international flights for flights to the final destination;
- from domestic to domestic flights;
- from domestic flights to destinations at the final destination.

Understanding this is of immense importance for logistics and marketing activities since it provides the opportunity to contact with many airlines with different endpoints. If all airlines want to fly on the same routes, then there will be no hub, but a crowded route with low prices for airfares [9].

For the development of a regional hub, we offer schematic models of two prototype hubs.

Hub-“hourglass” is characterized by a typical passenger flow from north to south, which in the morning concentrates in a hub for distribution between destinations in the south (Figure 5) [1]. When choosing such a coverage area, it should be said that the “hourglass” is more likely to be inverted, as more likely freight traffic from Asia to Europe.

Hub-“coverage area”, also called the “off-shore”-hub, collects passengers and cargo in its extended coverage area (highlighted in color) and distributes them to destination points outside this zone (Figure 6) [1].

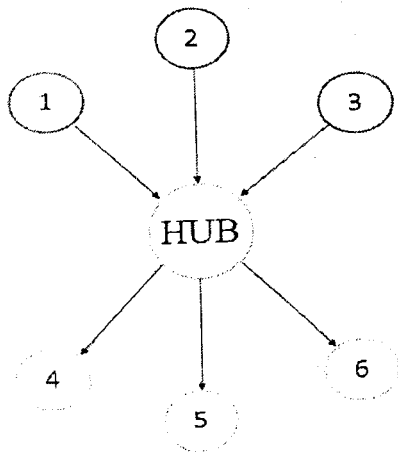


Figure 5. The scheme of the hub-“hourglass”

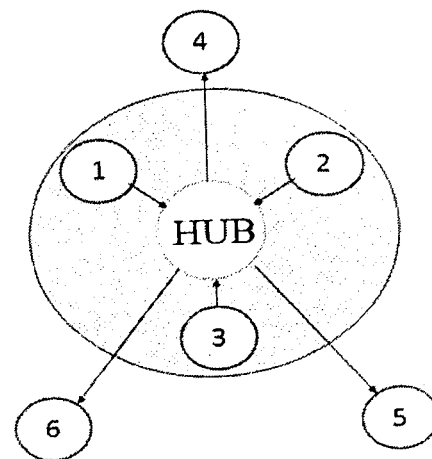


Figure 6. The Scheme of the “off-shore”-hub

3. Conclusions

From the above, it is possible to conclude that the “Boryspil” airport is the most promising option for the creation of a hub-airport in Ukraine.

It is difficult to choose a clearly defined version of the coverage of the territory for “Boryspil” airport. This is mainly due to the rather advantageous geographical location of Ukraine, which, with the correct approach, allows you to constantly expand the coverage.

It follows that the most deliberate decision to create a hub-airport in Ukraine will be the construction or refurbishment of not the airport as a whole, and the hub-terminal, one of the functions of which will be the implementation of relevant operations for express cargo and passengers.

Such a hub-terminal should also have the necessary infrastructure, which in aggregate will ensure the possibility of intermodal transportation and will significantly increase the passenger traffic in Ukraine.

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