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KEY FEATURES OF FORMATION AND DEVELOPMENT OF EUROPEAN AVIATION NETWORK

The article describes the regulatory features of European aviation network formation. The key trends of European aviation network development are identified, a model for its further improvement is presented taking into account the optimal location of aviation hubs.
Keywords: *aviation network; the EU; air transport; aviation hub; optimal location.*

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ОСНОВНІ РИСИ ФОРМУВАННЯ ТА РОЗВИТКУ ЄВРОПЕЙСЬКОЇ АВІАЦІЙНОЇ МЕРЕЖІ

У статті розглянуто особливості нормативно-правового забезпечення формування європейської авіаційної мережі. Виявлено основні тенденції розвитку європейської авіаційної мережі, представлено модель її подальшого удосконалення з урахуванням результатів оптимального розміщення авіахабів.
Ключові слова: *авіаційна мережа; ЄС; авіаційні перевезення; авіахаб; оптимальне розміщення.*
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ОСНОВНЫЕ ЧЕРТЫ ФОРМИРОВАНИЯ И РАЗВИТИЯ ЕВРОПЕЙСКОЙ АВИАЦИОННОЙ СЕТИ

В статье рассмотрены особенности нормативно-правового обеспечения формирования европейской авиационной сети. Выявлены основные тенденции развития европейской авиационной сети, представлена модель ее дальнейшего совершенствования с учетом результатов оптимального размещения авиахабов.
Ключевые слова: *авиационная сеть; ЕС; авиационные перевозки; авиахаб; оптимальное размещение.*

Introduction. In terms of globalization and accelerating of all market processes the important role has the improvement of international, regional and national transport systems for increasing the efficiency of the world economy and further development of integration processes. A promising direction in the development of the transport system is increasing the load on those aviation networks which provide the greatest transport performance over long distances.

Current trends in aviation networks involve changing traditional views on the functioning of European transport system. The development of aviation network creates additional competitive advantages for national economies and, at the same time, it is the most effective integration instrument of the global transport system. Formation of a single airspace through aviation network integration and creation of large international aviation hubs promotes the development and implementation of high standards of service and forms a unique proposal. But it requires the continuous improvement of development strategies to achieve global efficiency.

Latest research and publications analysis. Theoretical and practical aspects of national and international transport networks are covered in the studies of leading

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domestic and foreign scientists A. Emirova (2014), F. Gamba (2015), A. Gorev (2010), M.K.E.M. Hany (2010), V. Ivanov and A. Kuznetsov (2013). But the features of formation and development of European aviation network are studied insufficiently: the current state and development prospects are analyzed fragmentary, multifactorial diagnosis of its condition from the position of the holistic transport system is missing. The mechanisms of Ukraine aviation network integration into a single EU airspace are also insufficiently developed.

The object of the research is the process of formation and development of European aviation network.

The goal of the article is to deepen the theoretical and methodological foundations for European aviation network research in the context of globalization and to define the features of it development, to develop scientific and practical recommendations on Ukraine's entry to the EU aviation network.

The methods for the research are the abstract and historical analyses.

Key research findings. The development of transport networks is one of the most important economic factors contributing to integration. Under the influence of structural changes in the economy, especially such as replacement of the material and energy-intensive sectors by the knowledge-intensive sector, a new transport network is formed (Gorev, 2010).

Development of transport networks in integrations and associations has its special role, since the main purpose of most integrations is to ensure the free movement of goods, services and labor. The European Union (EU) is the largest regional association aimed to create a political, monetary and economic union of European states to remove all obstacles to free movement of goods, services, capital and people, as well as the formation of a common foreign policy. Currently, the EU is one of the main centers of the world economy, which has significant transport potential and pays sufficient attention to the development of an integrated transport system (Emirova, 2014).

The development of European transport network is one of the main objectives of the EU transport policy. Effectively functioning aviation network is to provide a connection between countries, that is prerequisite condition for sustainable economic development and increasing citizens' well-being. Activation of national aviation networks integration for EU members promotes not only regional, but also international cooperation.

Significant influence on the formation of a single European aviation network has the liberalization of transportation. The result of this process is the elimination of national barriers and opening of air travel markets. Liberalization of the airline market in Europe started under considerable disparities in the levels of socioeconomic and political development of its member countries. In each EU country, there was at least one state-owned airline that operated within a star structure of international and intercontinental networks, the central hub of which was a national airport. However, the connection of such networks was quite weak due to the lack of proper coordination of central and subsidiary hubs between the countries (The Maastricht Treaty, 1992).

Analysis of theoretical sources and legal acts in the EU regulation of air transport (EU Air Transport Liberalisation Process, Impacts and Future Considerations. Discussion paper No 2015-04; Official journal of the European Communities,

1992–2014; Hany, 2010) allowed identifying 3 stages of European aviation network formation and development:

Stage 1 (1987–1992) is the origin of the common EU policy in the field of regulation of aviation networks, characterized by adjustable air transportation market, aimed to expand national aviation networks and increase the international influence of national flagship airlines. Such airlines as "British Airways", "Air France", "Lufthansa", "Alitalia", "Iberia" and other acquired the monopoly status within internal European aviation networks under bilateral agreements on air services between certain countries. For example, the activity "Air France" was limited by the passenger and cargo transportation within France domestic aviation network and the international network France-UK (10 (More) out of TEN, 2011).

In 1987 the first package of measures to liberalize the air transport market of the EU was adopted. It consisted of two Directives (Council Directive No 87/601 on fixing fees for regular air flights within the EEC, Council Directive No 87/602, which allows airlines share passenger traffic and promotes new airlines access to the market for air transport) and two Regulations (Regulations No 3975/87 and Council Regulations No 3976/87, establishing the rules of competition in air transport and provide exceptions to the prohibitions for certain categories of agreements, such as joint planning and coordination of passenger flows) and came into force in 1988 (Official journal of the European Communities, 1987). This package regulate the operation of air networks within the Community and does not cover national traffic control and operation of aircraft in international networks outside the EU.

Thus, the first package of measures to liberalize the air transport market had no significant impact on national transport policies of each EU member state.

The second package contained three regulations: Council Regulation No 2342/90 on the fees for scheduled air transport services, Council Regulation No 2343/90 on access for air carriers to scheduled traffic routes within the Community and on mutual sharing of passenger capacity between air carriers on scheduled flights between Member States and Council Regulation No 2344/90, which provided the rules of competition in relation to certain categories of agreements and concerted practices in the air sector (Official journal of the European Communities OB No L 217, 1990).

However, despite the fact that airlines have a certain degree of freedom and partial access to a single air transport market of the EU, their activity was still limited by the scope of regulated bilateral regimes. If it was necessary, bilateral agreements had been corrected to achieve greater efficiency for a particular state airline.

Therefore, the first stage of formation and development of European aviation network included the coordination and strengthening of linkages between national aviation networks under the terms of bilateral agreements between states. The access to the air transportation market was limited, but market opportunities for large flagship airlines that had sufficient resources carrying capacity to work on international aviation European networks were increased.

Stage 2 (1992–2008) formed the grounds for a common policy in the EU aviation industry. The beginning of the stage can be considered the Treaty on European Union (Maahstryht) as of February, 7 (1992). Article B of the Treaty provides a sustainable and harmonious economic and social development of the member states by creating a space

without internal frontiers, strengthening economic, social and political connections between the countries. One of the tools to achieve this goal is the implementation of common transport policy (Art. 3), in which the Council of the EU had to formulate common rules for international transportation between and through the territories of the member states for each of the transport modes; to develop the arrangements for transportation vehicles nonresidents within the Member State; to develop and implement the measures to improve traffic safety etc. (The Maastricht Treaty, 1992).

Legal basis for the airlines functioning and development of European aviation network was ensured by the three main Regulations: No 2407/92 "On licensing of air carriers", No 2708/92 "On access for Community air carriers to intra-Community air routes" and No 2409/92 "On fares and rates for air services". They represent the third package of measures, which introduced the complete liberalization of air transport market (Official journal of the European Communities OB No L 240, 1992).

The formation of a single European airspace has been completed by the adoption of these Regulations. Member States have not lost sovereignty over their national airspace: according to common reconcilement and in the mutual interest of the EU they had delegated their powers of organization and the manner of transport services on aviation networks into the jurisdiction of competent authorities in the Community. Thus, there was a single air transport network with a single EU authorities and rules of organization and air traffic.

The second stage in legal provision of air transport networks was characterized by the ending of the EU air transport market liberalization process, laying the foundations of the single European sky, opening access to European aviation network for airlines, belonging to any member state.

Stage 3 (2008 – to date) is the stage of integration of aviation networks, which involves the conformity of legal base to relevant requirements of globalization.

In October 2008, when all previous regulations, that established the rules of European aviation network, lost power and were replaced by a single EU Council Regulation No 1008/2008 "On general rules for the granting of air services in the Community" the current stage of regulatory legal support evolution of the EU aviation network has began. Document combined three legal acts – Regulation No 2407/92, No 2408/92 and No 2409/92, and established the licensing of Community air carriers, the right of Community air carriers to conduct air services within the Community and free non-discriminatory pricing of air services within the Community. Special attention was paid to network security, which affected the access to aviation market for airlines of third countries (Regulation No 1008/2008 of the European Parliament and of the Council on common rules for the operation of air services in the Community, 2008). Air carriers were able to operate without restrictions leased with crew aircraft registered within the Community, except where it can endanger safety. But a member state may restrict agreements on sharing the use of aviation network when having doubt regarding technical and environmental compliance services partner with international standards under bilateral air service agreements with third countries.

It should be noted that with the beginning of the integration phase of European aviation network development, the load indicators on transport networks gradually increased, exceeding the growth rate of GDP.

Air transport network provides about 23% of the total EU external trade in passenger traffic services and almost 1% in freight services. EU is mainly an importer of passenger transportation services, but export of passengers' services is almost 24% higher than import, despite the fact that import growth is more dynamic. Since 2008, export of passenger services increased by 28.8%, including 34.3% of airlines services, while import increased by 14%, including 36.4% of airlines services. The share of passenger traffic in the total export of passenger transportation by all modes of transport in this period increased from 24% to 25.5%. Import has increased from 16.3% to 19.3% (Air transport statistics database..., 2008–2013).

The maximum load on aviation transport network is provided by passengers transportation. There is a tendency to increase the traffic of international networks, linking the EU with third countries. International passenger turnover of international aviation networks over the last 5 years increased by 5%, and in 2013 it increased by 3.8% as compared to 2012. Leading positions are occupied by Spain (28% of the total passenger turnover) and the UK (32%). Such indicators are caused not only by tourist attraction and a large number of educational programs, but also by the geographical position of these countries: countries washed by the Atlantic Ocean, making air transport most suitable for rapid and safe transportation. As for freight turnover, the largest volumes of traffic in the EU are typical for Germany (21% of the total turnover), France (28%) and the UK (21%). 72% of the total transportation of goods within the EU belongs to the aviation networks of these countries, but the growth rates are negative (Air transport statistics database..., 2008–2013).

Comparative analysis of some indicators of the global and European aviation networks allows concluding that both networks experience an increased pressure on passenger and freight traffic, and the European aviation network has a significant impact on the global network, although the growth rate of its performance is much less (Figure 1). Thus, in 2007–2013, the global network of passenger turnover increased by 66%, in Europe – 5%, freight turnover – by 33% and 7% respectively. The reason of such increases is the strengthening positions of Middle East and Asia aviation networks.

As noted above, the main on aviation network is due to transportation of passengers. Major airports, large aviation hubs in Europe, are located in such countries, as Germany, France, Britain, the Netherlands and Italy. In terms of passenger turnover in the EU the first place belongs to the main airport of the Netherlands – Schiphol (Amsterdam). In the past 5 years, the airport passenger turnover increased by almost 10% in international passenger traffic. Although it is significantly behind London Heathrow, the Paris Charles de Gaulle, and the Frankfurt on Main airport. The most dynamic passenger growth rates in the EU and behind its borders has demonstrated the airport Barcelona – by 30% in 2013 as compared to 2008 inside the EU and by 70% for outside the EU after the opening in 2009 of a new terminal and increasing throughput ability (Table 1). A moderate increase in international passenger traffic demonstrated the largest airports (Heathrow – 8%, Charles de Gaulle – 12% and Frankfurt on Main – 4%). It should be noted that these airports play a more important role in the development of international aviation network rather than for European one, because within international passenger turnover these airports one turnover is much higher than in the EU.

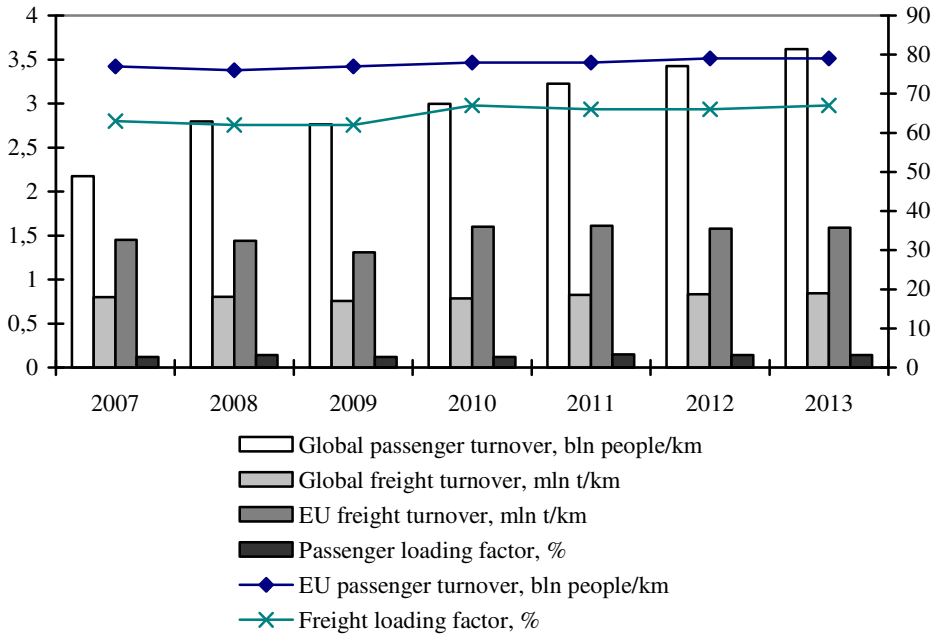

Figure 1. **The dynamics of the indicators of global and European aviation networks** (Air transport statistics database..., 2008–2013; Annual report of the Council..., 2007–2013)

Table 1. **The passenger turnover of the top EU airports** (Air transport statistics database..., 2008, 2012, 2013)

City	Airport	Passenger turnover between EU member state, mln people/km			International passenger turnover between EU and third countries, mln people/km		
		2008	2012	2013	2008	2012	2013
Amsterdam	Schiphol	26.61	28.39	29.25	20.81	22.71	23.37
London	Heathrow	22.38	23.42	24.60	39.26	41.94	42.79
Paris	Charles de Gaulle	25.72	24.65	24.40	29.61	31.25	31.77
Frankfurt	Frankfurt on Main	20.07	22.20	23.04	27.19	29.01	28.53
London	Gatwick	19.48	20.59	21.79	10.93	9.81	9.88
Munich	Munchen	15.36	17.25	17.87	9.23	11.58	11.50
London	Stansted	18.61	15.12	15.58	1.41	1.16	11.73
Copenhagen	Kastrup	13.50	14.55	15.27	6.12	6.96	6.99
Rome	Fiumicino	13.11	15.16	15.08	8.90	10.11	10.31
Vienna	Schwechat	12.48	13.95	13.96	6.59	7.66	7.50

According to the passenger traffic indicators at major airports in Europe, and taking into account the generally known tendency of increasing load on the Middle East (due to tourism development) we may build an approximate model of European aviation network (Figure 2).

Today the main European aviation hub, which can serve as a technical point and direct passengers travelling from the Western part of the EU to the East, is a set of

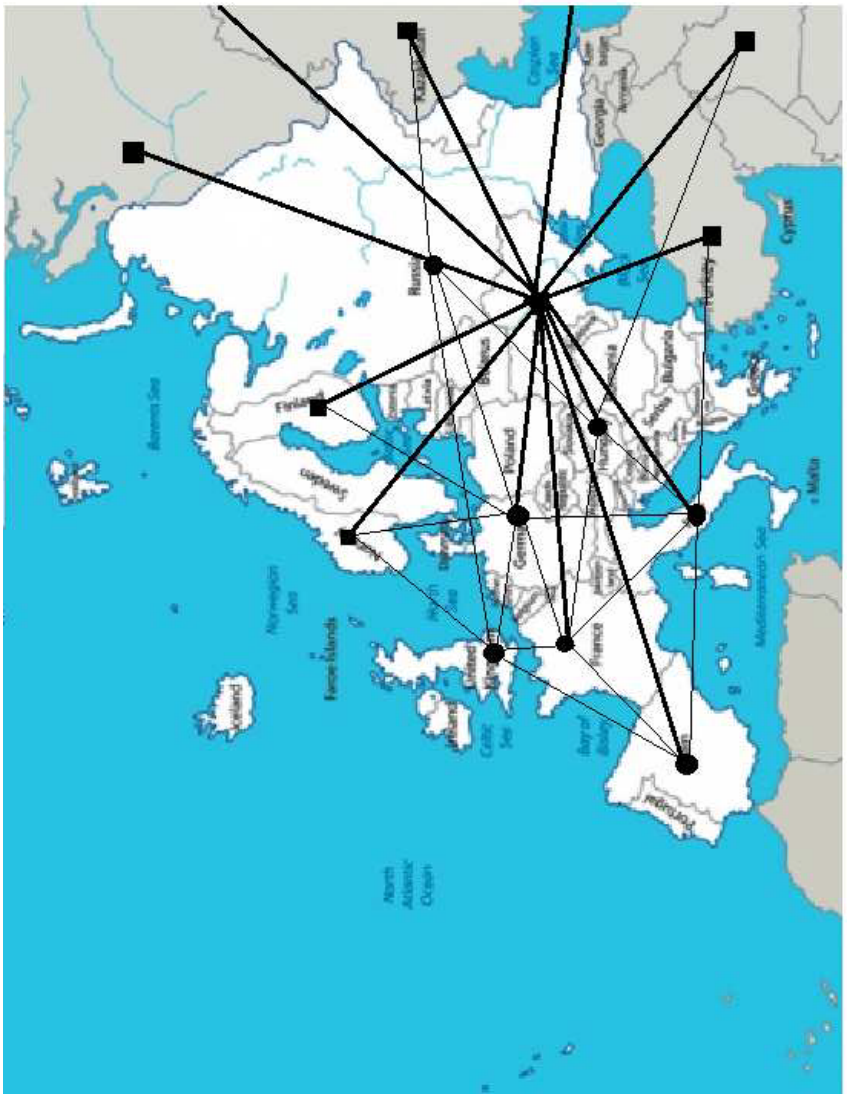

Figure 2. **A model of European aviation network,** *authors' development*

three Moscow airports "Domodedovo", "Sheremetyevo" and "Vnukovo". The airspace of Ukraine is hardly used, despite the fact that the state has an advantageous geographical position and a great potential as a transit hub for transportation to the East. The reasons for the lack of involvement of Ukrainian aviation network is the low level of air traffic management and air navigation and braking political and economic reforms in the context of the EU integration.

Creating large aviation hub in Ukraine would significantly increase the efficiency European aviation network. Airlines will be able to open new routes and use Ukrainian aviation hub as a point for passenger traffic and for extensive maintenance of aircraft.

In the world practice there are three ways to create a hub. The first way is the overall development resulting from the growth of the airlines work within national and international airspace. The second way is the leading airline development related to a particular airport. Requirements in any case are: having an attractive geographical position for an airport, sufficient space for its expansion and reasonable cost structure. Third way is the artificial development, when investors made a significant infusion of capital to an airport and airlines (Ivanov and Kuznetsov, 2013).

All three options are important for Ukraine, but the most realistic at the present stage of socioeconomic and political development of our state is leading the development of airlines. Ukrainian airport "Borispol", located near the capital (Kyiv) is the most attractive point for such a hub. This airport corresponds to almost all requirements.

However, the realization of this project is possible only under effective policy management of air traffic in Ukraine. In this context, top priority in the development of Ukrainian aviation network should become the active participation in European concept of the "Single European Sky". It is necessary to ensure the effective development of the state system of rational use of Ukrainian airspace.

Ukraine has a significant potential for aviation transportation market development. In this context, the EU is the priority partner of the state. In October 2006, Ukraine ratified the Agreement on certain aspects of air traffic with the EU. However, as it is stated in the introductory part of this Agreement, "European Community in the framework of these agreements does not seek to increase the total volume of air traffic between Ukraine and member-states of the European Community to affect the balance between airlines of the Community and airlines of Ukraine to agree on amendments and additions to the existing bilateral agreements of Air Services concerning the right of transport" (The concept of the Ukrainian transport system development..., 2007). The Agreement does not provide for an increase in international traffic. That is why signing the Open Skies Agreement between Ukraine and the EU is a necessary prerequisite for the inclusion of state aviation network to European and world airspace. This agreement will provide the necessary legal conditions for Ukraine's transition to common European rules guaranteeing traffic safety, mutual liberalization of air services, expanding economic opportunities for airlines, compliance with the EU standards and stimulate scientific and technical cooperation in aviation.

So, to become an active subject of European air transport market in the format of the single European sky, Ukraine should modernize the aviation industry accord-

ing to European standards to ensure the full implementation of the EU requirements regarding air safety system and modernize its air traffic management and air navigation services. Without the implementation of these measures, Ukrainian side will not receive the benefits of declared common aviation area and from having an international aviation hub as such. Domestic companies that find themselves in this new business environment can quickly lose in competition with European companies.

Conclusions. Basing on the assessment of the determinants of European aviation network it is defined that its development is characterized by common trends with the global aviation network, but at different rates. European aviation network is characterized by such features as the growth rate of passenger traffic between EU member states are growing more rapidly than the freight rates; the leaders in the EU aviation network development are Germany, France, UK and Italy; major aviation hubs of the EU are Schiphol, Heathrow, Charles de Gaulle and Frankfurt on Main; significant role in the development of EU aviation network is played by large airlines, which despite the crisis consequences manage to increase their profits consistently.

The author's model of European aviation network is based on the hypothesis about the need for having a major international aviation hub in the central part of Ukraine, which will not only strengthen cooperation between Ukrainian and European aviation networks, but also would contribute to the elimination of "white space" on the map of air traffic in Europe in the direction of the Middle East.

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