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SWOT-ANALYSIS OF THE DEVELOPMENT OF GENERAL AVIATION (IN PARTICULAR LIGHT AVIATION) IN THE ALMATY REGION

SWOT-АНАЛИЗ РАЗВИТИЯ АВИАЦИИ ОБЩЕГО НАЗНАЧЕНИЯ (В ЧАСТНОСТИ, ЛЕГКАЯ АВИАЦИЯ) В АЛМАТИНСКОЙ ОБЛАСТИ

АЛМАТЫ ОБЛЫСЫНДА ЖАЛПЫ МАҚСАТТАҒЫ АВИАЦИЯНЫ ДАМУЫНДА SWOT-ТАЛДАУЫ (АТАП АЙТҚАНДА, ЖЕҢІЛ АВИАЦИЯ)

Annotation. General aviation is an important part of civil aviation. General aviation has a long production chain that can lead to likely economic development impacts. In this article, we study the external factors of the development of the general aviation industry in the Almaty region, such as politics, economics, society, science and technology, using SWOT-analysis. Let's analyze the definition of the sides of location, economics, politics, weather, etc. etc., coming due to lack of talent, lack of airports and owned facilities, etc., opportunities such as government support and broad market prospects, etc. as well as risk factors such as fierce market competition, volatile market, and so on because of this, including the four strategies of positive development, backwardness reduction, threat avoidance and protection. These strategies may offer assistance in federal politics.

Keywords: SWOT-analysis, general aviation, Almaty region, strategy.

Аннотация. Авиация общего назначения является важной частью гражданской авиации. Авиация общего назначения имеет длинную производственную цепочку, которая может привести к вероятным последствиям для экономического развития. В этой статье мы изучаем внешние факторы развития отрасли авиации общего

назначения в Алматинской области, такие как политика, экономика, общество, наука и технологии, используя SWOT-анализ. Давайте проанализируем определение сторон местоположения, экономики, политики, погоды и возникающие из-за нехватки талантов, отсутствия аэропортов и собственных объектов и таких возможностей, как государственная поддержка и широкие рыночные перспективы. А также таких факторов риска, как жесткая рыночная конкуренция, нестабильный рынок и так далее из-за этого, включая четыре стратегии позитивного развития, сокращения отсталости, предотвращения угроз и защиты. Эти стратегии могут оказать помощь в федеральной политике.

Ключевые слова: SWOT-анализ, авиация общего назначения, Алматинская область, стратегия.

Аңдатпа. Жалпы мақсаттағы Авиация Азаматтық авиацияның маңызды бөлігі болып табылады. Жалпы мақсаттағы авиацияның ұзақ өндірістік тізбегі бар, ол экономикалық даму үшін ықтимал салдарға әкелуі мүмкін. Бұл мақалада біз SWOT-талдауды қолдана отырып, Алматы облысындағы саясат, экономика, қоғам, ғылым және технология сияқты жалпы мақсаттағы авиация саласын дамытудың сыртқы факторларын зерттейміз. Орналасу, экономика, саясат, ауа-райы және т. б. тараптарының анықтамасын талдайық. және т.б. таланттардың жетіспеушілігінен, әуежайлардың және жеке объектілердің жоқтығынан, мемлекеттік қолдау және кең нарықтық перспективалар сияқты мүмкіндіктерден және т. б., сондай-ақ қатаң нарықтық бәсекелестік, тұрақсыз нарық және т. б. сияқты тәуекел факторларынан туындайды. Осыған байланысты, оның ішінде төрт оң даму стратегиясы, артта қалуды азайту, қауіп-қатердің алдын алу және қорғау. Бұл стратегиялар федералды саясатқа көмектесе алады.

Түйін сөздер: SWOT-талдау, жалпы мақсаттағы авиация, Алматы облысы, стратегия.

Introduction. The general aviation terminal was coined in the 1950s on a steering wheel. After the 1990s, "general aviation" consolidated the national legislation of Kazakhstan in accordance with ICAO documents, which marked the connection of Kazakhstan with international general aviation. General aviation is an important part of civil aviation. According to the Civil Aviation Law, general aviation refers to all aviation activities using aircraft, external public air transportation, including all types of flights, such as industry, American economy, forestry, fishing, construction, trade, healthcare, tourism, etc. e. General aviation has a large industrial group and a long industrial chain, which includes production, operation, maintenance, fuel, training, insurance and other business areas, therefore, can provide economic development and is of great economic importance [1]. As a large economic area, the general aviation industry developed rapidly until 1990 and began to gradually effectively implement economic development measures and improve the living conditions of the population in the Almaty region, but after these years, problems in development until 2004 are associated with legal restrictions. SWOT analysis is an important method of analyzing the development of an organization, which is often used in the business strategy formula. The use of SWOT analysis to analyze the development of the general aviation industry in the Almaty region, the study of strengths, weaknesses, opportunities and threats can be useful for industrial strategy and the development of the general aviation industry for the Almaty region.

SWOT - Analysis of general aviation in the Almaty region

A. Strengths

1) Location and geographical advantages

As an important part of the One Belt, One Road Economic Corridor, Almaty region on an international scale also plays the role of a link between the economic zone of Europe, China and

Central Asia. At present, it is an effective ecological and economic zone in the delta of the Zhetysu rivers and the Alatau mountains. According to the unique geographical advantages, we can make domestic and international strategic planning, fully connect with the highway and high-speed rail, and then get additional benefits and win-win results. At the same time, the Almaty region is rich in tourism resources, the fabulous city of Almaty, the wonders of mountains and rivers, etc., which creates all the conditions for the development of tourism projects in light aviation.

2) Economic benefits

Almaty is one of the largest economic regions of Kazakhstan and the first in terms of population, taking into account the city of Almaty. In 2018, the GDP (gross domestic product) of the Almaty region with the city of Almaty reached 12.1 trillion tenge, this is the first place in Kazakhstan with a per capita income of \$575. The development of the general aviation industry is closely related to the economic base, when the GDP per capita reaches \$4,000, the general aviation industry will enter the rapid development channel [2]. At \$8,000, general aviation will experience explosive growth. Thus, with state support, the Almaty region has an economic base for the development of general aviation, unlike other regions of the country.

3) Strengths of the policy

Since 2002, the regulation of the activities of ultralight aviation began with the introduction of the concept of ALS. The association proved to government officials the need to introduce all former DOSAAF aviation into the civil aviation system, which has lost any jurisdiction, not belonging to either the Ministry of Defense or the Ministry of Transport and Communications. By the summer of 2002, the current situation led to the fact that more than 120 aircraft of the ALS, practically uncontrolled by the state, occupied a light niche of aviation chemical works at that time, and the level of flight safety was expressed in one figure: on average, 7 people died annually.

After the adoption in 2002 of a package of documents regulating the activities of the ALS, aviation accidents have significantly decreased. The further participation of the Association in the development of regulatory legal acts in the field of civil aviation helped to somehow preserve the potential of light aviation left over from the USSR. According to the order of the Minister of Transport and Communications No. 577 dated December 21, 2010, the Association is a member of the expert council on private entrepreneurship and currently remains under the current Ministry for Investment and Development, and is also accredited by the "National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken". On this platform, the ALE "KAMA" together with the authorized body of civil aviation represented by the Civil Aviation Committee carried out a huge amount of work to bring the aviation legal framework in line with the requirements of ICAO and international practice in the field of light and ultralight aviation for its development and ensuring flight safety.

In particular, since 2015, KAMA has conducted an examination on introducing amendments to the Tax Code of the Republic of Kazakhstan, since the tax rates applied by the Tax Code until 2016 were one of the main deterrents for the development of light aircraft. In the Republic of Kazakhstan, the state policy in the field of aviation is aimed at solving the global problems of transporting commercial passengers and cargo, and does not allow solving many problems in the effective implementation of all the possibilities of light aviation.

The role of light aviation in creating a personnel reserve for civil aviation is underestimated. More than ever, the issue of compliance with the current legislation with the requirements of the time, the presence in the structure of the authorized body of a unit that will directly provide services and promote the interests of light aircraft becomes relevant. The absence of such a body in Kazakhstan preserves the position of light aviation as a stepdaughter in a large family called civil aviation. According to the existing Regulations on the GA Committee, the obligation of the Committee to develop the industry is not prescribed, there is no direct dependence of the results of the Committee's activities on indicators of industry growth.

In the state register of the GVS of the Republic of Kazakhstan, there are 585 units of light aircraft, including 313 An-2 aircraft, 151 aircraft of the SLA, 65 helicopters and aircraft of 3 and 4

classes of Western production, 56 helicopters and aircraft of 3 and 4 classes of Soviet production. There are 26 main and about a dozen regional (district) airports registered in the country. There are growing problems with further operation, already in the category of historical, An-2 aircraft, which still do not have a full-fledged replacement, and there is no emphasis on transferring responsibility mainly to the operators themselves, as required by ICAO [3].

Almaty region will actively develop all kinds of new types of general aviation services, such as rescue, private flights, official flights, aircraft rental, air sports, etc. General aviation will become a new point of economic growth.

4) Strengths of research and education

Almaty region is a large cultural province which has very good higher education resources with colleges and universities and many research institutes. In particular, in the development of civil aviation talent Academy of Civil Aviation. Aviation technology and the experience of related colleges and universities have unique advantages for the development of general aviation, and can rely on the intellectual resources of research institutes and universities to promote the development of the general aviation industry.

5) Strengths of the industry cluster

Private companies have developed rapidly in recent years. Currently, there are fourteen general aviation companies, which is 50.9% of the total number of general aviation companies in Kazakhstan. The spatial agglomeration of these general aviation companies can form the competitive advantage of the aviation cluster.

b. Weakness Analysis

1) Operating activities are highly dependent on the season and weather. General aviation operational projects in the Almaty region are mainly focused on flight training, forest protection services and other services [4]. A low share falls on business aviation and recreational flight projects. Flight training and aerial forestry services are highly affected by seasonality and weather, aircraft utilization is low, and operational numbers are generally insufficient. General aviation companies have to spend a lot of money on aircraft maintenance, pilot and maintenance personnel, etc. d. The plight of high cost and low returns is a big obstacle to the development of general aviation.

2) Lack of general aviation airport

Currently, there are about 6 transport airports and four general aviation airports in the Almaty region. The number of general aviation airports is insufficient and the distribution is relatively scattered [5]. However, general aviation needs more airports to accommodate takeoffs and landings. As a result, the limited number of airports affected the further development of general aviation in the region. If general aviation wants to form a mature industry chain, in addition to aircraft, the necessary personnel and airspace capacity, a number of necessary supporting conditions are also needed. At present, there are not enough conditions for the development of general aviation, such as aircraft maintenance, training, emergency aviation, air navigation, air traffic control; the conditions of the relevant ancillary services are inadequate.

3) Shortage of professionals

Pilots and maintenance personnel are two types of specialists for general aviation, which are also key factors limiting the development of general aviation [6]. Now there are about a hundred pilots in the region, including seventy flight instructors. Meanwhile, it has about 40 general aviation aircraft, one transport needs two pilots, the number of pilots is not enough. Although there are many schools for pilot training, for example Falcon Avia. The training regime for general aviation pilots, as a rule, is carried out at his expense, which the average household cannot afford. In addition, compared to civil aviation and military pilots, the income of general aviation pilots is lower, so there are few pilots willing to work in general aviation companies. There are only 30 licensed maintenance specialists in the region and the corresponding shortage of specialists severely limits the development of general aviation.

C. _ Opportunity Analysis

G airspace will support the development of the general aviation industry. For many reasons, Class G airspace operations were completely open, which was the main reason for limiting the development of general aviation. In 2018, began to reform the airspace service in the class G, flight altitude from 1000 to 4000 feet, which marked the beginning of the comprehensive development of low-altitude airspace and the promotion of the development of general aviation. Since 2016, KAMA has initiated "Multiple Opinions to Promote Civil Aviation" projects, which marked the development of civil aviation in the national strategy, and a number of policies, including simplification of approval procedures for routine flights, relaxation of private flight licensing standards, and decentralization of construction approval authority. airports, etc. The area attaches great importance to the development of general aviation, relying on the general aviation industry in the US practice, four sectors of the general aviation industry would be built, respectively, aircraft manufacturing, maintenance, and flight training. KAMA's assistance in the development of the industry in many ways, such as the construction of an airport, the opening of an air route and general aviation services, etc. The organizations also actively contribute to the development of general aviation in the region.

2) General aviation has broad prospects

General aviation is an industry with huge market potential that has yet to be launched. In recent years, the annual growth rate of the aviation industry in Kazakhstan is 5%. According to data provided by the CAA, in 2017 general aviation flight hours totaled 139,800, up 12.9% from the previous year. Among them: the operation of industrial aviation 63,900 hours, an increase of 20.7%. Agroforestry aviation operates 28,200 hours, an increase of 7.2%. Other operations 47,700 hours, an increase of 6.9%. Relevant experts predict that in the next 20 years it will become the fastest growing region in the world in the business aviation market and it will need at least 1200 corporate aircraft, the total number of different types of aircraft can reach one to two thousand [7]. The development of the general aviation industry in the region will contribute to the development of the economy and employment in the region. With general aviation as the core, the industry can be formed into a huge industrial chain, including aviation training, maintenance, consulting, financial leasing, insurance, etc., and then promoting the development of other related industries.

D. _ Threat Analysis

1) The general aviation market is volatile The general aviation market is a high investment, high return and high risk market. General aviation is extensive, involved in various sectors of the national economy and has a strong professional composition, so the volatility of the general aviation market is very high. As everyone knows, due to the characteristics of air operations, the operation of general aviation is greatly influenced by factors such as weather and seasons, and flight time in rescue operations is closely related to the emergency [8]. In addition, some projects will scale up or down as government policies change. For general aviation operations in one year, there is an obvious peak season in the off-season, some airlines often buy aircraft and other resources to meet the peak season requirements, but in the off-season, this can cause a huge waste of resources and losses. Due to the volatility of the general aviation market, general aviation enterprises usually face financial problems, which negatively affects the expansion of the enterprise and even leads to a vicious circle. In terms of operating time in the region, 83.9% is occupied by flight training. The breakdown of working time in a mature aviation market is as follows: flight training accounts for 20%, recreational flying 60%, and public flying 20%. Therefore, the industrial structures of general aviation in the region still need to be further adjusted, and the general aviation market still needs to be further developed.

2) Competition in the domestic general aviation market is high.

As a strategic developing industry, in addition to Almaty region, general aviation has attracted much attention from many local governments and the construction of an aviation industrial park. In particular, the level of economic development of the adjacent territories of the region will create strong competition. The Turkestan region will face increased competition for attracting investments.

3) Risk of overcapacity bottlenecks

Once a country decides to develop general aviation, general aviation will begin to grow rapidly. Local governments have raised a hot wave of development of general aviation. Many aviation industrial parks have been built to promote investment and economic development. As a consequence, the bad phenomena of blind following and malicious hype will appear, leading to the same type of layout, hype, low competition and many other problems. In the development of the general aviation industry chain, the imbalance between each link in the aviation industry supply chain, between upstream and downstream, as well as production capacity and infrastructure, will turn the industry into an overcapacity bottleneck.

Strategy for the development of general aviation in the Almaty region

Based on a SWOT analysis of the general aviation industry in the area, we have offered the following strategic advice on how to take full advantage of strengths and opportunities and then mitigate weaknesses and threats. As shown in Figure 1.

| | Opportunities | | |
|-----------|---|--|------------|
| Strengths | SO - Positive Development Strategy 1. State general planning, formulates plans for the development of general aviation and optimizes the available resources for its development. 2. Make appropriate policies to support the development of general aviation, strengthen financial fund support. 3. Conduct scientific research for the development of general aviation. | WO - Weakness Reduction Strategy 1. Increase the number of elements of flight operation to reduce the negative impact of bad weather and climate. 2. Accelerate the construction of general aviation airports and related support services facilities. 3. Improve the cultivation and collection of high-quality talent for the general aviation industry. | Weak sides |
| | ST - Threat Prevention Strategy 1. Further adjustment of the structure of the general aviation industry and expansion of the general aviation market. 2. Strengthen government regulation, avoid disorderly competition. | WT - Defense strategy 1. General aviation enterprises need to consolidate the existing market. 2. To study foreign experience in the development of general aviation in developed countries, to form their own characteristics and core competitiveness. | |
| | Threats | | |

Fig. 1. Strategic SWOT analysis matrix for the development of general aviation in the Almaty region

Conclusion. General aviation is an important part of civil aviation. The level of development of general aviation is a high level of development of domestic science and technology, economy and people's lives. It is also important in socio-economic development. In order to develop a general purpose, a general planning should be adopted, to formulate plans for the development of a general purpose and limit the resources for its development. Preliminary observations to support the development of general purpose, strengthen the financial support of the fund and expand the construction of general airports and related support services. It is also necessary to strengthen government regulation and avoid disorderly competition. General businesses need to consolidate the existing market and increase their flight operations to reduce the negative impact of bad weather and climate. Moreover, general purpose enterprises must have private characteristics and benefits.

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FEATURES OF THE DEVELOPMENT OF VIRTUAL REALITY APPLICATIONS FOR TRAINING AVIATION INDUSTRY SPECIALISTS

ОСОБЕННОСТИ РАЗРАБОТКИ ПРИЛОЖЕНИЙ ВИРТУАЛЬНОЙ РЕАЛЬНОСТИ ДЛЯ ОБУЧЕНИЯ СПЕЦИАЛИСТОВ АВИАЦИОННОЙ ОТРАСЛИ

АВИАЦИЯ САЛАСЫНДАҒЫ МАМАНДАРДЫ ОҚЫТУҒА АРНАЛҒАН ВИРТУАЛДЫ ШЫНДЫҚ ҚОСЫМШАЛАРЫН ӘЗІРЛЕУ ЕРЕКШЕЛІКТЕРІ

Abstract. In this paper, the methods of developing virtual reality applications designed for the training and retraining of aviation industry specialists are considered. The analysis of the stages of development of software tools for VR applications is carried out.

Key words: virtual reality (VR), augmented reality, programming, modeling, visualization, assembly.

Аннотация. В данной работе рассмотрены методы разработки приложений виртуальной реальности, предназначенных для подготовки и переподготовки специалистов авиационной отрасли. Проведен анализ этапов разработки программных средств VR-приложений.

Ключевые слова: виртуальная реальность (VR), дополненная реальность, программирование, моделирование, визуализация, сборка.