

PAPER • OPEN ACCESS

Development of High-Tech Segment in the GCC Region on the Example of the Aviation Component of the Kingdom of Bahrain

To cite this article: L V Shkvarya *et al* 2019 *IOP Conf. Ser.: Mater. Sci. Eng.* **476** 012025

View the [article online](#) for updates and enhancements.

Development of High-Tech Segment in the GCC Region on the Example of the Aviation Component of the Kingdom of Bahrain

L V Shkvarya¹, I AZ Aidrous¹, E I Ruzina¹, A V Savinsky¹ and S I Rodin¹

¹ Peoples' Friendship University of Russia, Moscow 117198, Russia

E-mail: destard@rambler.ru

Abstract. The article shows the necessity and the prospects of high-tech activities development in the GCC countries (Oman, Qatar, Kuwait, Bahrain, Saudi Arabia and the United Arab Emirates) on the example of Bahrain. It explores the role of high-tech industries in the world and in the region, in particular, the high and growing importance of aerospace activities in Bahrain and other GCC countries and substantiates the view, concerning the possibility to enhance cooperation in this area between Bahrain and Russia.

1. Introduction

Modern economic practice confirms that the level of development and socio-economic dynamics of a country and even of a whole region largely depends on the presence and degree of high-tech industries development (neither than industrialization).

The development of the high-tech sector of the economy is becoming a determining factor in economic growth, since the transition of the economy to the production of high-tech products is accompanied by a drastic decrease in the level of material consumption and energy intensity of production, productivity growth and increased competitiveness of the economy. [1] Problems of high-tech industries development in the XXI century are becoming crucial for many countries of the world.

Many authors note [2] that the modern conditions, seriously complicated by significant disproportions in the world trade force the Cooperation Council of the Arab States of the Gulf, namely Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates to strengthen the process of the national economy transformation towards non-oil specialization - both at the regional and at the global levels. Long since being a transport hub, uniting the countries of Asia, Africa and Europe, the region paid special attention to the development of the transport system. Moreover, due to different social and economic objectives of the Kingdom of Bahrain, the top priority is paid to the aviation transport.

The purpose of this article is to explore the aviation segment of the transport sector of the GCC countries in relation to the formation of new opportunities and elements of high-tech industries. This study is focused on a group of six countries and provides information on the development of air transport in the GCC countries, as well as the results of this development, which are highly differentiated with respect to the countries of the region.



To achieve this goal, the methods of structural and statistical analysis, based on the data of international organizations (UNCTAD) for 2007-2017 were used, since long-term trends allow to determine the development vector.

2. The role of high-tech industries in the global and regional economy

Modern economic practice confirms that the level of development and socio-economic dynamics of a country and even of a whole region largely depends on the presence and degree of high-tech industries development (neither than industrialization).

The development of the high-tech sector of the economy is becoming a determining factor in economic growth, since the transition of the economy to the production of high-tech products is accompanied by a drastic decrease in the level of material consumption and energy intensity of production, productivity growth and increased competitiveness of the economy [1].

A high-tech sector of the economy is most commonly understood as such a segment of the national economy in which "... high-tech technologies play a dominant, key role, and the costs on research and development (R&D) exceed the average value of this indicator in other sectors of the economy ..." [3].

At the same time, despite the long period of high-tech sectors and industries development in the modern world economy and their wide distribution both in developed and developing countries, the inclusion of a particular industry (or production) in the group of high-tech is conditional, which is confirmed by various researchers.

Thus, according to A.E. Varshavsky, "The assignment of a branch or production to the number of science-based or high-tech, accepted in foreign and domestic literature is conditional: this group includes those industries that are characterized by exceeding a certain fixed level of expenditures on R&D in relation to the amount of produced or shipped products, added value or the value of the main production factors (production assets and labor) " [5].

In this regard, approaches to the classification of high-tech industries also differ. The most widespread classification of high-tech industries is presented in Table 1.

Table 1. Approaches to the classification of high-tech industries

Item No.	According to the classification of National Science Foundation	According to the classification of UN
1.	Aviation and space rocket industry	Air and spacecraft
2.	Computers and telecommunications	Electronic computing and office equipment
3.	Electronics	Electronics, equipment for radio, television and communications
4.	Nuclear technology	Radioactive materials and other chemical products
5.	Production of weapons and military equipment	Weapons
6.	Biotechnology	Pharmaceuticals
7.	Optoelectronics	Devices (medical, optical, measuring)
8.	Development of new materials	Non-electric machines (nuclear reactors, gas turbines, etc.)
9.	Production related to computerization	Electric machines
10.	"Life Sciences"	

Source: [4]

The American National Science Foundation refers industries, including manufacturing (for example, aircraft and spacecraft; computer equipment; communication equipment and semiconductors; chemicals and pharmaceuticals; testing, measuring and control devices; motor

vehicles and their parts; railway and other transport equipment; machinery) and service sectors (for example, education, health care, business, R&D, financial and information services) to high-tech (science-based) [6].

According to the data of the annual report, Science & Engineering Indicators - 2018, issued by the foundation, industries that largely embody new knowledge and technological advances in their production, which is reflected in their R&D costs and the use of R&D in the provision of services, account for almost a third (31% in 2017) of the world economic production. The leaders in this sphere are the USA (traditionally) and China, which surpasses EU countries in this segment since 2012 (Table 2 and Fig. 1). These two countries account for 31% and 24% of the global share, respectively [6].

As can be seen from the presented data, the global crisis of 2008-2009 had a significant and negative impact on the production of high-tech products. In addition, the global recession of 2014-2015 also had a negative impact on the considered segment in the EU, Taiwan, some countries in Asia and the rest of the world as a whole.

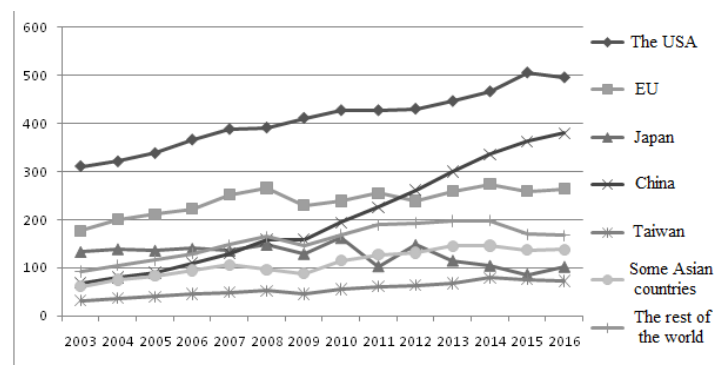


Figure 1. The release of high-tech industries' production in some countries and regions of the world in 2003-2016, billion dollars [Source: compiled, using the table. 2]

Table 2. The release of high-tech industries' production in some countries and regions of the world in 2003-2016, billion dollars.

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
The USA	311	321	338	366	388	391	411	427	427	430	446	466	505	495
EU	177	201	211	223	252	266	230	239	255	239	259	274	259	264
Japan	133	139	136	140	136	148	129	162	103	148	115	104	86	102
China	69	80	90	110	130	158	159	194	226	262	300	336	363	380
Taiwan	32	37	40	46	49	52	46	56	61	64	68	79	76	73
Some Asian countries	61	75	83	95	106	96	88	115	127	131	145	146	137	138
The rest of the world	92	105	116	130	148	165	147	169	189	193	197	198	170	167

Source: [6]

Consequently, it can be said that high-tech segments in the economies of both countries and regions and in the global economic system strongly depend on the general socio-economic dynamics of the respective countries and regions [7].

Like the specialization model for other scientific and technical indicators, each region specializes in several different types of activities. The United States has advantages in building aircraft and spacecraft, as well as in measurement and control devices. High-tech manufacturing of aircraft and

spacecraft includes a supply chain of other high-tech materials, such as navigation devices, computing and communication equipment — many of them are still provided by American suppliers.

The EU also has relative advantages in these two areas: aviation / spacecraft and measurement and control devices. China is the largest producer of a large high-tech manufacturing, information and communication technology (ICT) sub-sector, with a 34% of global share.

Despite China's rapid progress, high-tech manufacturing in the country is still largely determined by lower added value, such as a final assembly. Despite the development - and rather active - of the aerospace sphere, China still largely depends on semiconductors, supplied by foreign firms for most of its manufacturers of smartphones and other electronic devices [8].

Many experts note [9] that high-tech segments are actively developing in 'Arabian six', as well as in developing countries, such as India, South Korea and Brazil. Technology transfer processes promote their development in many ways. Experts consider technology transfer as a development factor [10].

3. Aerospace segment in the GCC on the example of the Kingdom of Bahrain

The aerospace segment in the GCC countries has been steadily and rapidly developing for the few decades. It is not only and not so much because of the accelerated growth of the transport market, both global and regional, but due to the strategic position of the region in the system of international transport flows. The steady economic growth of the countries of the region over a long period laid the financial foundation for the development of high-tech segments of the region's economies. In addition, the need to develop aviation transport and the aviation industry in general and the aerospace industry is intensified by the growing need to diversify the economies of the Cooperation Council for the Arab States of the Gulf - Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the UAE.

Worldwide, aviation creates 62.7 million jobs and brings 2.7 trillion dollars annually. In the Middle East, these figures amount to 2.4 million jobs and 157.2 billion dollars in annual regional income. According to analysts of the Boeing company, the aviation market is growing by 5% annually and by 2037 the volume of air traffic will increase by 2.5 times and the number of civil aircraft will double. In addition to orders for new aircraft, the current fleet will need to be updated by 75% in the next 20 years. Thus, the market can demand up to 40 thousand new aircraft [11].

The countries of the Gulf are keeping up with the times, investing in airport infrastructure projects, including the airport modernization program, in the formation of elements of the aerospace industry, in the development and substantial improvement of the relevant infrastructure.

Thus, Bahrain, being an island nation and a tourist center, needs air transport badly, as more than 2 million tourists, attracted by amazing antiquities, oriental culture and luxury leisure, as well as, the annual stage of 'Formula 1'. Bahrain is an important hub of international airlines.

The Ministry of Transport and Communications of the Kingdom of Bahrain is in charge of the development of the regulation of the aviation industry of the Kingdom of Bahrain. Its main goals in the considered segment are the following [12]:

1. Regulation of the civil aviation sector in order to improve flights safety and aviation security and to enhance the regulatory and supervisory role in accordance with national and international regulations.
2. Development and improvement of services in the field of navigation and meteorology in accordance with standards and international achievements.
3. Development of the infrastructure of the civil aviation sector.
4. Development of personnel potential of the civil aviation sector.
5. Work with all companies, operating in this sector to improve the quality of all services provided to all users of Bahrain International Airport.
6. Strengthening the position of Bahrain and its regional leadership in the field of civil aviation, as well as encouraging investment and employment opportunities, aimed at increasing the contribution of the civil aviation sector to the economy.

There are 4 modern airports in the country.

Bahrain International Airport, located on Muharraq Island, the largest both in this country and in Saudi Arabia, receives up to 9 million passengers a year, including Bahraini residents. It is planned to expand the airport in the next 4 years. The cost of the project, which will help to increase the number of passengers to 27 million in 30 years, 3 times more than the current capacity, is 1.8 billion Bahrain dinars. Today the Kingdom implements a number of programs to improve and modernize the infrastructure and services of the international airport and take it to the world level. Upon the project completion, the airport's capacity will increase to 14 million passengers a year.

In 2010, the Bahrain International Airport was awarded as the best airport in the Middle East, which is the proof the high quality of services. This aviation hub met such criteria as comfort, ease and speed of passenger services, etc. at the highest level.

Gulf Air, the national airline of Bahrain, is based at Bahrain International Airport. It operates flights to 39 destinations in 24 countries on three continents. The airline has one of the widest route networks in the Middle East, performing two flights a day to more than 10 cities in the region, as well as to Russia (from October 28, 2014). Moscow has become the first capital in Eastern Europe, where airline planes began flying.

Gulf Air was founded in 1950 as one of the first commercial airlines in the Middle East, so in 2015 it marked 65 years. Today, Gulf Air is a major international airline, renowned for its traditional Arabic hospitality and exceptional service quality. The Gulf Air fleet consists of 26 modern wide-body and narrow-body aircraft. The airline closely monitors market trends and constantly improves the quality of products and services for tourists and business travelers, responding to the changing needs of passengers and anticipating their expectations.

As the flag carrier of the Kingdom of Bahrain, Gulf Air is one of the key assets of the national infrastructure, which stimulates the development and growth of the state economy.

Gulf Air is an official airline and a sponsor of the Bahrain Grand Prix of the 'Formula 1' and the 'Bahrain International Airshow' in 2014.

In 2007, Bahrain Air, a private airline with a capital of 8 million Bahraini dinars (1 dollar = 0.39 dinars), will become the second national carrier in the Kingdom of Bahrain after 'Gulf Air'. 'Bahrain Air' operates flights to the Gulf countries and to Africa. At the first stage, 140 flights per week on 13 routes and the transportation of 10 thousand passengers were carried out. The company's owners are private investors from Bahrain (68% of shares) and Saudi Arabia (32%).

'Air Bahrain' is the second low-cost airline in the Gulf countries after 'Air Arabiya' (Emirate of Sharjah, United Arab Emirates).

Freight and passenger transportation by air in Bahrain is presented in the table 3.

The importance and significance of air transport for Bahrain is evidenced by the fact that since 2010, the Bahrain International Airshow has been held in the Kingdom of Bahrain, which is currently the fastest growing air show in the Middle East and attracts an increasing number of global companies. It should be noted that Bahrain can be considered as a "bridge" to the regional market in this field, as well as in many others, since the formation of a customs union in the GCC allows to cooperate with any country in the region, regardless of the country, the company has initially 'entered'.

The Bahrain International Airshow, being the fastest growing exhibition in the Middle East, reflects the steady growth of the aerospace sector of the region for years to come and will be inextricably linked with this growth as a business coordinator [13]. In 2018, it will be held from 14 to 16 November. It is interesting to note that the stand of the National Science Space Agency of the Kingdom of Bahrain (National Science Space Agency, NSSA), which was created in 2014, will be presented at the airshow.

The agency aims to create a robust infrastructure to observe outer space and the Earth, to make Bahrain achievements in space science and technology more accessible, to form a culture and technique of scientific research in the kingdom and to encourage technical innovations. In particular, it is assumed that the state will support citizens of Bahrain, working in a wide range of areas, related to space science and technology. The agency plans to launch Earth satellites for remote sensing (ERS), as well as for conducting scientific space research, including the use of the latest satellite communication

technologies. Experts believe that Bahrain can benefit from the experience of such countries as Algeria, the United Arab Emirates, Saudi Arabia, Qatar, India, Singapore, Pakistan, Japan and others, having a long history in space science [14].

Table 3. Freight and passenger transportation by air in Bahrain in 2000-2015

Date	Freight		Passenger transportation	
	Volume of freight, mln ton-km	Change in accordance with the previous year, %	Number of passengers, pax.	Change in accordance with the previous year, %
2015	240,1	-7,07	5 313 756,0	2,75
2014	258,4	-2,73	5 171 496,0	11,78
2013	265,6	-21,43	4 626 648,0	-21,07
2012	338,1	-19,04	5 861 787,0	4,84
2011	417,6	-17,23	5 590 998,0	-7,26
2010	504,5	-10,6	6 028 980,0	15,6
2009	564,3	33,49	5 215 512,0	128,3
2000	208,8		1 382 461,0	

Source: compiled according to UNCTAD data.

His Excellency Kamal Bin Ahmed Mohamed, Minister of Transport and Communications and in charge of National Air Ambulance, stressed the high importance of developing the Kingdom's space science and technology sector, noting that this important work directly corresponds to the goals of Bahrain's 2030 economic vision for promoting higher education, research, innovation and government services throughout the kingdom [15].

Currently, Bahrain is negotiating with Russia for sending its astronaut into space; the UAE has already agreed. Russia can offer Bahrain cooperation in space research, the creation of advanced space technology, the provision of space services in the field of remote sensing of the Earth, space communications, navigation, space education, flights to the ISS, etc.

Bahrain can be considered as a center for the promotion of space services and products in the Gulf and Africa countries [16].

4. Conclusion

The study suggests that the development of high-tech segments of the national economy is of particular importance for the GCC countries of the XXI century. Thus, the task of creating and developing the aerospace segment as the flagship of the high-tech segment of the national economy, which the Kingdom of Bahrain is facing now, fully correlates with the national development strategy until 2030.

The GCC countries have both a need (development and diversification of the national economy in the context of the growing volatility of the global hydrocarbon market and the need to create a significant number of highly paid and prestigious jobs for the growing population of the country in the national economy) and the opportunity, predetermined by significant financial resources, generated in Bahrain and other GCC countries as a result of hydrocarbons export to the world market, to create a high-tech component and, in particular, the aerospace segment.

However, Bahrain, like other GCC countries, at this stage of activity badly need the international cooperation with the countries that can provide their assistance in achieving the ambitious plans, set by the leaders of Bahrain and the region's countries in general. In this regard, the possibility of cooperation of the Russian Federation in the aerospace sphere seems actual.

Acknowledgments

The paper was prepared with the financial support of the project №203151-0-000 «The economy of the members of Cooperation Council for the Arab States of the Gulf in the world economy digitalization»

References

- [1] Gavrilova S V 2014 Conceptual Framework for the Definition of High-tech Sector of the Economy and the Operation of High-tech Companies *Economy. Statistics. Computer science* **2** 53-57
- [2] Rusakovich V I 2015 Global Imbalances in the World Trade: modern approaches, problems and opportunities for regulation *Economic Systems Management*. **9**(81) 16
- [3] Bendikov M A and Frolov I E 2007 *High-tech Sector of the Russian Industry: Status, trends, mechanisms of innovative development* (Moscow: Nauka)
- [4] Laptev A A 2008 The Concept of "High-tech Company" in Modern Microeconomic Theory *Quality. Innovation. Education* **1**
- [5] Varshavsky A E 2000 High-tech Industries and High Technologies: definition, indicators, technical policy, share in the structure of the Russian economy *Economics of Modern Russia* **2** 10
- [6] *Science & Engineering Indicators* – 2018 <https://www.nsf.gov/statistics/2018/nsb20181/report/sections/overview/knowledge--and-technology-intensive-economic-activity>
- [7] Shkvarya L, Grigorenko O, Strygin A, Rusakovich V and Shilina S 2016 *Central Asia and the Caucasus* **17** 103-112
- [8] *PricewaterhouseCoopers (PwC) 2014 China's impact on the semiconductor industry: 2014 update. A decade of unprecedented growth.* <http://www.pwc.com/gx/en/industries/technology/chinas-impact-on-semiconductor-industry/2014-full-report.html>
- [9] Rusakovich V I 2018 *Asia and Africa today* **3**(728) 48-55
- [10] Solovieva Yu V 2016 *Asia and Africa today* **8**(709) 42-47
- [11] *Boeing: Commercial Market Outlook* <http://www.boeing.com/commercial/market/commercial-market-outlook>
- [12] *Ministry of Transport and Communications of the Kingdom of Bahrain* <http://www.mtt.gov.bh/content/strategic-objectives>
- [13] *National aerospace magazine Vzlyot* <http://www.take-off.ru/item/2471-aviashou-v-bakhrejne-perspektivy-razvitiya>
- [14] *Geospatial World* <https://www.geospatialworld.net/news/bahrain-launches-national-space-science-agency/>
- [15] *Royal family of Bahrain: news & information* <http://houseofkhalifa.com/bahrain-national-space-agency-nssa-launches-space-team-programme/>
- [16] Aidrous I A Z 2016 Bahrain: small country - great opportunity? *RIAC* <http://russiancouncil.ru/analytics-and-comments/analytics/bakhreyn-malenkaya-strana-bolshie-vozmozhnosti/>