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Gulf Innovation Systems: Formation Features and Development Prospects

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Yuliana Vladimirovna Solovieva¹, Anna Vadimovna Korenevskaya²,
Natalia Evgenievna Lebedeva³

Abstract:

Purpose: The conditions for interaction of innovative process participants, the features of creation and development of technology transfer systems in the Gulf States are considered. The authors have shown the need for a research on innovative processes of the countries whose state policy directions are the positive social and economic dynamics, the increase in national competitiveness, and the diversification of national economy.

Design/Methodology/Approach: Investigating the problems of technological transfer in these countries and the systematic approach we have found reflection in application of all elements of innovative processes (the states, spheres of science, the industry, etc.), which allows for revealing prerequisites of technological development of the GCC economy.

Findings: There is a need for activation of innovative processes in all spheres of national economy in the GCC and search for mechanisms of ensuring innovative development of the national firms.

Practical Implications: On the basis of the analysis of national innovative systems functioning in the GCC countries, the authors have identified the most perspective directions of integration development in the scientific-educational and production spheres.

Originality/Value: Positive socio-economic dynamics, improvement of national competitiveness, diversification of the national economy are priority areas of the GCC countries' state policy, which determines the need to find and form effective mechanisms ensuring innovative development of national economies, as well as transfer of knowledge and technologies.

Keywords: Innovative system, transfer of technologies, Gulf Cooperation Council.

Paper Type: Research Paper.

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¹Federal State Independent Educational Institution of Higher Education "Peoples' Friendship University of Russia" (RUDN University), jouliana_sol@mail.ru

²Federal State Independent Educational Institution of Higher Education "Peoples' Friendship University of Russia" (RUDN University), korena84@yandex.ru

³Financial University under the Government of the Russian Federation, natalia@miravillegroup.com

1. Introduction

The economic development of the state depends on a number of factors affecting not only the increase in real volumes of production, but also the company. As economies evolve, the list of these factors is adjusted, and their importance is assessed. For most of the world's leading countries, the development of innovation, knowledge economics and technological transfer becomes a priority. In this regard, there is a need to study innovative processes in countries for which positive socio-economic dynamics, increased national competitiveness and diversification of the national economy are priority areas of public policy. Such countries include the countries forming the integration grouping, the Gulf Cooperation Council (GCC).

The GCC regional alliance is the most successful in the Arab world. On key economic indicators such as GDP, as well as GDP per capita, the countries of the Council have separated significantly from other Arab States. GDP indicators have positive dynamics in all GCC countries. Over the period 2010-2017, they increased 1.3 times more than in the Gulf countries on average (Table 1).

Table 1. GDP dynamics in GCC countries in 2010-2017 (\$ million)

Country	2010	2011	2012	2013	2014	2015	2016	2017
Bahrain	25,71	28,78	30,75	32,54	33,39	31,13	32,15	35,31
Qatar	125,12	167,78	186,83	198,73	206,23	164,64	152,45	167,61
Kuwait	115,42	154,03	174,07	174,16	162,63	114,04	110,91	120,13
UAE	286,05	348,53	373,43	388,60	401,96	370,30	357,05	382,58
Oman	58,64	67,94	76,69	78,94	81,04	69,83	66,82	72,64
Saudi Arabia	526,81	669,51	733,96	744,34	753,83	646,00	644,94	683,83

Source: Compiled by the authors.

2. Materials and Methods

As basic research methods we used system approach, comparative and statistical analysis of indicative values of innovation and technological development of the GCC countries. So, system approach found reflection in application of all elements of innovative processes (the states, spheres of science, the industry, etc.) that allows to reveal prerequisites of technological development of the GCC economy. Investigating the problems of technological transfer in the countries of the GCC, the authors analyses both statistical data, and the legislative base which is the cornerstone of formation of national innovative systems of member countries of GCC.

Methods of the comparative and statistical analysis of data are for this purpose applied. The Global Innovation Index (GII) has been calculated annually since 2007 by the Economist Intelligence Unit (Table 2). In 2017, the study covered 127 countries, collectively producing 99% of world GDP.

Table 2. *GII of GCC member countries, 2017.*

Score	Country	Rank
35	UAE	43,24
55	Saudi Arabia	36,17
49	Qatar	37,90
66	Bahrain	34,67
56	Kuwait	36,10
77	Oman	31,83

Source: Compiled by the authors.

Each of these countries has gone its own path of innovative development, the peculiarities of which formed the basis of their national innovation systems (NIS).

3. Results

Economic and technological development of the GCC member countries means forming a regional model of development, which includes intra-regional distribution of labour in accordance with geographic location, natural resources, level of economic and technological development. We will consider the main features of innovative development and a transfer of technologies in GCC countries. As note (Edler and Fagerberg, 2017), *“There is a narrow perspective, considering invention only, and there is a broader, more holistic perspective, which emphasizes the importance of looking at the entire innovation cycle from the creation of novel ideas to their implementation and diffusion”*.

4. Discussion

4.1 United Arab Emirates (UAE)

The UAE economy is actively moving from an economy based on natural resources to an innovative economy based on knowledge and the latest technologies. This is shown in the UAE Vision 2021, which aims to create a state which sets the key themes for the social and economic development of the UAE and calls for a shift to a diversified and knowledge-based economy. The NIS of the UAE is based on the integration interaction between the spheres of science, education, industry and government structures. The UAE has invested heavily in education and capacity-building, forming the basis for long-term competitiveness. Budget allocations for education in the UAE account for more than 20% of the total budget (Ahmad Bin Byat and Osman Sultan, 2014).

Most UAE universities carry out not only educational but also research activities. The education system began to develop in the UAE in the 1980s, when major universities such as Al Khawarizmi International College, Ajman University of Science and Technology, Higher Colleges of Technology were established.

The University of the UAE was founded first in 1976. It established research centers of strategic importance to both the country and the region as a whole, engaged in R&D in critical areas and covering a wide range of activities (water resources, cancer treatment, etc.).

An independent Emirates Center for Strategic Studies and Research is being established in 1994 to conduct social, economic, political, military and strategic studies concerning the UAE and the GCC area. In 1996, the Centre of Excellence for Applied Research and Training, the largest investor in technology discovery and commercialization, is being formed. In 1998, government-funded Zayed University was established, becoming the first internationally accredited federal university in the UAE.

In 2004, the first research university focused on postgraduate education was founded -The British University in Dubai. All its programs are accredited by the UAE Ministry of Higher Education and Scientific Research. In the same year, a non-profit non-governmental organization is being formed to stimulate investment in science and technology at the regional and international levels, the Arab Science and Technology Foundation.

In 2005, the Emirates Institution for Advanced Science and Technology was created as part of a strategic initiative of the Dubai government for promoting innovation, high technology, and sustainable development of the UAE.

In 2007, two major institutes are being opened: Khalifa University of Science Technology & Research (an independent, non-profit educational and research institution, part of the Abu Dhabi government initiative, conducts interdisciplinary research of a strategic nature) and Masdar Institute of Science and Technology (specializing in science and advanced technology, alternative energy, environmental protection and sustainable development).

In 2009, the national network for the development of research and education of the UAE - Ankabut, whose activities are aimed at interaction of academic institutions, state institutions, educational organizations both within the UAE and at the world level, was created.

Since 1995, the Emirates has begun to form the technoparks. The first technopark in the UAE was Dubai Investments Park, a unique combination of industrial, commercial and residential areas managed by Dubai Investments Park Development Company LLC. Then were created Dubai Internet City and Dubai Media City.

In 2005, the UAE is building the Dubai Silicon Oasis Authority (DSOA), whose main investments are focused on the development of microelectronics and the semiconductor industry. In 2006, Abu Dhabi Airports Business and Logistics Park was established in the oasis, the slogan of which is «Innovation in aviation». In

2016, Dubai opened National Industries Park, focused on trade and industrial sectors.

In 2014, Sheikh Mohammed bin Rashid al-Maktum, announced the launch of the National Innovation Strategy aimed at making the UAE one of the most innovative countries in the world. The strategy involves the introduction of innovative technologies and working methods in industries for which innovation is key to development: renewable energy, transport infrastructure, education, health, technology, water and space development.

4.2 Saudi Arabia (SA)

The development of the research sector of SA takes place by encouraging the establishment of independent research centers and laboratories at universities, increasing public spending on research, active use of foreign experience, personnel and investments.

In 2016, the SA Vision 2030 Development Strategy was approved. The objective of the Strategy is to reduce dependence on oil revenues by the diversification of the national economy, the development of the social sphere, and a gradual shift away from oil dependence towards high technology, investment in science and education. The strategy aims to raise the share of non-oil exports from 16% to at least 50% of non-oil GDP until 2030.

The formation of the NIS began with the founding in 1957 of the first secular university - King Saud University. At that time, the main goal was to build the structure of primary, secondary and special education, the development of which was assumed by the State, while stimulating the private sector to involve in the development of productive industries (Looney and Frederiksen, 1985).

In 1963, the King Fahd University of Petroleum and Minerals was established, with a number of colleges currently operating for training and research. In 2002 King Abdullah Bin Abdulaziz Science Park was founded at the University, providing interaction between enterprises, scientists of enterprises and the university, engineers.

The major scientific and educational center is King Faisal University, founded in 1975 in the form of four institutes and now has 17 institutes and 24 research centers.

In 2009, the private Research University of Science and Technology of King Abdullah (KAUST) is being established, organizing interdisciplinary joint research groups. The Research and Technology Park created at KAUST allows high-tech companies to organize offices, laboratories, demonstration facilities, provides incubator space to technological start-ups.

The establishment of the King Abdulaziz City for Science and Technology (KACST) in 1977 was a significant influence on the formation of the Kingdom's NIS. KACST operates in accordance with the National Science, Technology and Innovation Development Plan, adopted in 2002, aimed at 15 strategic areas.

The key structure forming and coordinating the research sphere in SA is the Ministry of Higher Education. It is competent to prepare *“strategic plans to develop the system of higher education in various fields and contributes to building a knowledge-based society and an economic system based on the generation, dissemination and use of knowledge in order to keep up with contemporary international trends in higher education”* (Plan to Achieve Excellence ..., 2010). Education spending in the Kingdom accounts for 25% of the budget and about 10% of GDP, the highest in the world (Tyukaeva, 2016).

In order to stimulate scientific activity, the First Expanded Five-Year Plan on Science, Technology and Innovation for the period 2010-2014 was launched in 2010, developed by KACST and aimed at the formation of NIS.

In 2011, a technology development and investment company, TAQNIA, was established under the Saudi State Investment Fund. According to Dr. Al-Saud, *“TAQNIA will represent the technological investment arm of the Saudi government and take part in diversifying the national economy under the umbrella of the Kingdom’s plan to move to a knowledge economy”*. The establishment of TAQNIA was conceived with *“the purpose of the company is to commercialize the research and development results carried out in the Kingdom and to help transfer technological innovation to the Kingdom in collaboration with international companies”* (TAQNIA, 2012).

4.3 Qatar

Qatar's transition to a new type of economy is embedded in Qatar National Vision 2030, according to which the state is focused on ensuring the growth of humanitarian, social, economic directions, environmental protection, and the formation of an innovative economy. Speaking at the IV annual Qatar Foundation Forum, its Chairperson Sheikha Moza bint Nasser noted that *“since 2009, the Qatari government has been allocating 2.8 per cent of its GDP (gross domestic product) to promote research, technology and innovation”*, and called upon all Arab countries to cooperate in that regard. *“We have funded, so far, 78 research projects for 53 institutes in 12 Arab countries, with more than US\$68 million”*, said Nasser (2012).

The forum stressed that the greatest challenge for the country is the lack of research workers (compared to Norway, a country of about the same size in terms of economy and geography, Qatar has 10 times fewer scientists - only about 1,000).

Qatar's key NIS structure is the Qatar Foundation (QF). It is a non-profit organization set up with the aim of achieving a diversified and stable economy, as well as Qatar's support for various businesses, from carbon mining to knowledge economics, revealing human potential. QF includes a number of research organizations.

4.4 Bahrain

The formation of the NIS in Bahrain has its own characteristics. Thus, the growth of business and innovation activity, which followed the oil boom of 1973, stimulated Bahrain's transition to the development of non-oil sectors of the economy. Greater attention has been given to human resources. Bahrain is the first country in the Gulf to open a public school for boys in 1919 and for girls in 1928 (Al-Misnad and Sheikha Abdulla, 2014). Bahrain was thus the first GCC country to provide education for women. The foundations of higher education were laid in the 1960s, when Bahrain had its first public colleges.

In 1986, the Kingdom opened its first national university, the University of Bahrain. In the development program of the University of Bahrain "*Bridge to the Future: Transformation plan 2016-2021*", implemented within the framework of the national strategy Economic Vision-2030, renewable energy, water safety, food safety are declared as priority areas of research.

In 2008, Bahrain opened a government higher education institution, the Polytechnic University of Bahrain. According to Bahrain Polytechnic Strategic Plan 2015-2019, the university plans to develop applied research to solve social and industrial problems, increase opportunities for entrepreneurship and innovation development. It should be mentioned separately about the regional University of the Arab Gulf, established in 1979. The University implements effective innovative, educational programs in the areas of health, human development, environment, science and technology, dissemination of a culture of knowledge and education in Arab Gulf society. The first private university, Ahlia University, was founded in 2001. In 2018, the Kingdom operated 10 private universities.

The State and its programs have a decisive role to play in the development of innovative processes in Bahrain. A national long-term strategy, Bahrain Economic Vision-2030, was adopted in 2008, giving an important place to the innovative component of the national economy. The strategy is oriented towards the development of three key aspects: economic growth, effective government, well-being of society.

4.5 Kuwait

To date, Kuwait's economy is relatively open. In terms of economic openness, Kuwait was ahead of countries such as Norway, France, Spain, Malaysia and

Argentina a few years ago, but is now in the 81st place, after Italy and Serbia (Index of Economic Freedom, 2018).

The development of Kuwait's NIS is strongly influenced by its resource base. As in many countries in the region, Kuwait's economy is based on the oil sector. Thus, about 50% of GDP, 90-95% of foreign exchange revenues and 75% of the revenue part of the budget is formed by the oil industry (Kasayev, 2009). Kuwait was the first Gulf country whose oil companies had moved beyond their own territory. At the same time, it should be noted that in 1976 Kuwait established a special institute known as the Reserve Fund for Future Generations, to which 10% of oil revenues are transferred annually.

The principle of equality of citizens in the distribution of national wealth is proclaimed in the country. State regulation of the economy is carried out (75% of GDP is created in the public sector). Kuwait's leadership has embarked on a strategy aimed at diversifying the economy, expanding private sector activities, improving education standards and increasing employment for its citizens. The Kuwait Financial House report records that these efforts include large government spending programs for infrastructure, education and health with support for private sector investment.

The Government of Kuwait has prepared the Kuwait National Development Plan, aimed at transforming Kuwait into a leading world-class regional financial, commercial and cultural center by 2035. The key direction, as stated in the Plan, is to support projects to develop the knowledge economy, including through research on water resources, sustainable development of agricultural systems, research on opportunities for desert and urban development, production methods of desert planting.

The first university - Kuwait University - was founded in 1966 and today consists of 17 colleges-faculties, becoming not only the largest educational, but also an innovative research center.

The Science Development Fund (KFAS), founded in 1976 with the aim of creating a prosperous culture of science, technology and innovation for a stable Kuwait, and the formation of an STI culture (Science, Technology and Innovation), brought a lot to the formation of the NIS. The purpose of the Foundation is to stimulate the advancement of science, technology and innovation to the benefit of society, research and enterprises in Kuwait.

4.6 Oman

Unlike other Gulf countries, Oman does not have large oil reserves. *“Oman's leadership seeks to reduce the country's dependence on the oil industry, and hence on the country's dependence on speculative play of oil prices in world markets”*

(Matveev and Al Resi Nasser Saif Ahmed, 2018). In 1995 Sultan Kabus approved Oman Vision 2020 development strategy, according to which the economy of the country by 2020 should no longer focus on "black gold."

The Strategy emphasizes that one of the most important pillars of economic policy and long-term objective is the diversification of the Omani economy, the creation of an economy based on renewable resources and integrated with the world economy. In quantitative terms, this means an increase in the share of the non-oil sector to 15% of GDP.

The strategy is essentially the second phase of Oman's development project. The first occurred in 1970-1995, and the basis of the educational system was laid during its implementation. Thus, in 1980 the largest university of Oman - Sultan Qaboos University was founded. It now has 10 research centers. In 2001, Sohar University was founded, research in which is interdisciplinary.

In 2002, the Middle East College (MEC) was formed, affiliated with universities in Great Britain and the Netherlands. MEC is located in Oasis Knowledge Muscat, where there are many transnational corporations, small and medium-sized enterprises, start-ups, with a successful business incubator program.

The Research Council of Oman (TRC) was established in 2005. As the Chairman of the Council noted: *"The establishment of TRC is, without doubt, a significant step in the scientific, economic and social development of Oman. Research is essential to nation building – it underpins progress, economic growth and prosperity; it helps us better equip and train our workforce and encourages creativity and innovation; it leads to greater entrepreneurship and helps industry growth. In short, research makes our nation more competitive in the global economy"* (Chairman's Message).

5. Conclusion

Having considered the features of the formation of research centers in the Gulf countries, we conclude that there is now an awareness in the Gulf countries of the need to intensify innovative processes in all spheres of national economy. The possibility of innovative development is determined by their considerable financial resources, accumulated in both the public and private sectors, and by the growth of funding for research and development. At the same time, the search for mechanisms to ensure the innovative development of the national economy and the withdrawal of the countries of the region to the group of countries with competitive economies at the world level remains a pressing issue for scientists, politicians, and practitioners.

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