International Journal of Psychosocial Rehabilitation, Vol. 24, Special Issue 1, 2020
ISSN: 1475-7192

The Role of Technopolis in Japan in the Development of Innovative Activities.

[1]Vokhidova Kh. Mehri, [2]Dinara Atadjanova

Abstract--*This article analyzes the strategy of Japan to develop an innovative economy in the country by creating technopolises.*

Object of the article - Japanese technopolises

The subject of the article is the experience of Japan in the development and organization of a technopolis in the development of an innovative economy.

The aim of the article is to study the system of organization of Japan's technopolis, create conditions for scientific research and industrial application of the results of scientific research by technopolis clusters.

Scientific novelty of the article:

- emphasizes the role of Japan in world innovation indicators and the nature of innovation policy;

- emphasized the essence of the Japanese strategic program "Technopolis-90";

- The activity of Japanese technopolises was studied on the example of the technopolis Tsukuba.

Keywords--*innovation, technopolis, world innovation index, Japan, Tsukuba, research, nano and biotechnology.*

I. INTRODUCTION

There are different types of free economic zones (FEZs) in the world economy that specialize in the development of industry, trade and entrepreneurship. Most of the above mentioned FEEs are typical of the economies of developing countries and are aimed at boosting the country's export potential, employment, and development of the country through the attraction of foreign investment. However, there is another type of free economic zone, which is widely used in the experience of developed countries (including Japan): techno parks, technopolis, high-tech zones or, in general, innovative free economic zones.

The key to the success of Japan's advanced raw-based economy is innovation (focused on economic innovation through Technopolis).

For the last 20 years, the country has been in the list of the 15 most powerful countries by the degree of innovation in the economy. In particular, according to the 2019 World Innovation Index, Japan is ranked 15th. The state's research spending in 2017 was $ 168.6 billion. The total number of patents received in the country in 2018 was 318,479, and according to the ICT Development Index, the country was ranked 10th in 2017.

[1]*Tashkent state institute of oriental studies, Uzbekistan, mehrivoxidova@gmail.com*
[2]*Editor at Tadqiqot.uz, Uzbekistan, Info@tadqiqot.uz*

DOI: 10.37200/IJPR/V24SP1/PR201243
Received: 19 Jan 2020 | Revised: 08 Feb 2020 | Accepted: 27 Feb 2020

Table 1: Japan's innovative development in international rankings *

No	Indicators	2017	2018
1.	Knowledge Economics Rating (2000, 2012)	17	22
2.	World Innovation Index	14	13
3.	Patent Activity Rating	451 320	318 479
4.	The cost of the research is $ 1 billion	168,6	-
5.	Index of development of information and communication technologies (place)	10	-

* The Global Innovation Index 2017-2019 is compiled by the author

Japan's high performance in innovative indices is due to the government's policy to support technopolis, operating technopolis, and their innovative activity.

Increased experience in the creation of various forms of free economic zones (including technoparks) in Uzbekistan will also allow us to study the experience of a country with experience in the establishment and development of technopolis, such as Japan, and to use some aspects of Uzbekistan's economic interests. Therefore, the study of this topic is one of the most up-to-date research.

II. RESEARCH METHODOLOGY

The topic of the study is broad scientific and practical study of the measures taken under the Technopolis-90 program on innovative development of Japan since the 1980s, one of the most advanced countries in the world economy.

The methods of induction, deduction, scientific abstraction, the methods of analysis and synthesis are used effectively in scientific research of the topic.

III. THE DEGREE OF STUDY OF THE SUBJECT

Japan's policy of introducing innovative technologies in industries and sectors of the economy has been the subject of scientific research in the natural sciences.

In particular, Michael I. Luger (1, Michael I. Luger) studies comparative analysis of the experience of the US, Japan and Europe in the development of regions and the implementation of innovations in the economy.

Studies conducted at Tsukuba University and Technopolis H.Kumadaa, A. Matsumurab, H. Sakuraia, T. Sakea, M. Yoshiokac, H. Kobayashic, H. Matsumotoc, Y. Kiyanagid, T. Shibatae, H. Nakashima (2, Kumadaa) and others), Yasuhiro Yasutomi (3, Yasutomi), The development of material science in Tsukuba is reflected in the work of Mohamed Henini (4, Henini).

However, there is a lack of scientific research in the country that has studied the mechanism of development and experience of Japanese technopolis, which necessitates a deeper study of this topic.

IV. ANALYSIS AND RESULTS

Japan has extensive experience in the development of scientific and technical zones. Their establishment in the country began in the 1980s under the program "Technopolis" developed by the Ministry of Foreign Trade and

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Industry of Japan. The program envisages the creation of about 20 scientific and technical zones in some economically isolated regions of the country. They were called technopolis and were interpreted as the city and adjacent territory. There are high-tech industries, scientific institutions, universities, training scientific and engineering personnel for technopolis, residential buildings with modern production and social infrastructure.

Of the 40 regions that applied for the technopolis competition in accordance with the Technopolis-90 program adopted in 1982, 19 were selected for the creation of technopolis and a separate development plan for each technopolis was developed.

The Technopolis program is considered by the Government of Japan as one of the most effective strategies for accelerated development of scientific and technical potential of the country, giving it a 21st century vision. It is envisaged that it will contribute to the country's competitive position in the world markets. It included the following tasks:

- moving the industry from the center to the remote regions (6, Dong-Ho Shin);

This task envisages the development of towns with a population of less than 250 people, including the construction of roads, railways and telecommunications networks, and the creation of other areas of infrastructure.

- directing the industry towards more sophisticated and energy-saving technologies;

It means to produce competitive products with high added value in the country.

- intensification of research across the country through the strengthening of local universities and more.

This objective is to ensure that all phases of the education system are interconnected, envisaging the development of research and industry cooperation.

Today, there are more than 20 technopolis in Japan, with about 11,000 small and medium-sized enterprises, as well as 280 educational institutions.

Table 2 Technopolis in Japan and their specialization *

Name of Technopolis and the area where it is located	**Strategic direction of industrial development**	**Local higher education institution**
1.Hokkaido, Hakodate	Development of marine resources, local minerals for cold climates	University of Hokkaido
2. Akita, Akita	Electronics, Mechatronics, New Materials, Utilization of Local Natural Resources, Biotechnology, Electric Power Sources	Akita University
3.Niigata, Nagaoka (Nagaoka)	Automated production systems, design and fashion (winter wear, including sportswear), use of local natural resources	Nagaoki College of Natural Sciences and Technology

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4.Totigi, Utsunomiya (Utsunomiya),	Electronics, Mechatronics, Chemicals, New Materials, Computer Software.	Utsunomiya University
5. Shizzuoka, Hamamatsu (Hamamatsu)	Optoelectronics, mechatronics, electronic musical instruments, sound equipment	Sudzuoka University, Khamamatsu Medical College
6.Toyama, Toyama (Toyama, Takaoka)	Mechatronics, new materials, biotechnology, information technology	Toyama University, Toyama College of Medicine and Pharmacology
7.Okayama, Nagore Kibi (Okayama)	Biotechnology, electronics and mechatronics used in the medical and pharmaceutical industries	Okayamya University, College of Natural Sciences
8.Hiroshima, Hiroshima-Tsuo (Curie)	Electronics, Mechatronics, New Materials, Biotechnology	University of Hiroshima
9. Yamaguti, Ube	Electronics, Mechatronics, New Materials, Electronic Resources Development, Biotechnology	Yamaguti University
10. Fukuoka / Saga, Kurume-Tosu (Kurume)	Mechatronics, Pure Chemicals, Fashion, Biotechnology	Kurume College of Engineering, Kurume University
11.Oita, Kenhoku-Kunisaki (Oita, Beppu)	Electronics, Mechatronics, Electronic Industry, Computer Software	Oita University, Oita College of Medicine
12.Kumamoto, Kumamoto (Kumamoto)	Automated machines, robotics, biotechnology, electronic equipment, information systems	Kumamoto University, Kumamoto College of Engineering
13.Miyadzaki, Miyadzaki	Electronics, Mechatronics, New Materials, Biotechnology, Use of Local Resources	Miyadzaki University, Miyadzaki College of Medicine
14.Kagoshima, Kokubu-Hayato, Kagoshima	Electronics, Mechatronics, New Materials, Biotechnology	Kagoshima University, Gusun University
15.Aomori, Aomori	Mechatronics, biotechnology	University of Hirosaki,
16.Xiogo, Zap. Harima (Himimzi)	Fine mechanics, medical industry	College of Chemistry of Chemistry
17.Wakayama, Gobo (Wakayama)	Leisure industry, pure chemicals	Wakayama University,
18. Kagawa, Zap. Kagawa (Takamattsu, Sakaide, Marugamo, Tsentudji, Utatsu)	Development of marine resources, precision engineering, measurement technology	Kagawa University,

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19.Nagasaki, Sasebo (Sasebo)	Marine Engineering, Energy, Mechatronics	University of Nagasaki
20.Tsukuba, Tsukuba	Development of R&D, establishment of direct links with industry and agriculture and their reconstruction on the basis of new technologies.	University of Tsukuba

*Abe H., Alden J.D.(1988). Regional development planning in Japan // Reg. Studies. – Oxford etc., 1988. – Vol.22, N 5. – P.429–438.

Japanese technopolis are focused on scientific research in the field of electronics, mechatronics, biotechnology, chemical technology, medicine and pharmaceuticals and their direct introduction into the industry, with each technopolis being established on the basis of a specific higher education institution.

The specialization of the technopolis mentioned above is one of the important features of the program "Technopolis-90". But there are features common to all technopolis in Japan. Including:

1. Strengthening the training base for modern high-tech enterprises and research centers. It is planned to expand existing universities and technical schools, to build new ones, to introduce new science and training programs for undergraduate and graduate students; to invite qualified professors from the central universities of the country, if not for permanent employment, at least to study at least correspondence courses; permanent contacts with foreign universities, especially American universities, exchange of specialists.
2. Work actively to build scientific institutions, equip them with equipment and return to their homeland, to reduce the employment and urbanization of college and university graduates who have previously left the region and have high qualifications in businesses or institutions in the central region. ;
3. Creation of an industrial park and attraction of large modern firms, including foreign ones. Tax and social benefits in technopolis, availability of highly qualified personnel make the region attractive for foreign firms;
4. Organization of incubators and other ways of developing small and medium-sized businesses.
5. Together with the central government's efforts to develop venture capital, it opens up ample opportunities for previously untapped economic growth in Japan.
6. Expansion of transport network, modernization of airports and express railways.
7. Construction and reconstruction of existing telecommunication networks on the most modern technical basis: optical fiber, satellite communication, cable television and others.
8. To make full use of traditional industries available for the region, to upgrade and develop them based on the latest achievements of science and technology.
9. Creation of advanced infrastructure to support and implement the project.

One of the most successful technopolis in Japan in the 21st century is Tsukuba.Tsukuba is also a technopolis established by the government's decision in the 1980s, and is one of the regions funded by public funds. Local government and private equity play a key role in building technology, and the development of small and medium-sized businesses is also important. Legal entities engaged in scientific research are exempt from property and construction taxes.

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Tsukuba is primarily the center of fundamental sciences, and research and industry interactions are at the forefront.

Tsukuba has four research areas:

1. Development and application of modern cancer treatment methods;
2. Live with individual robots, that is to ensure the presence of robots in the household. The way humans live with individual robots has several stages of development:

- Empirical Research on Personal Care Robots (2009)
- Transformation of security standards to international standards (2013);
- Operation of test facilities related to robot safety certification (2014-present);
- Complete Market Scope (2015);

3. Practical use of Algal biomass energy;
4. Creation of TIA-nano - global center of nanotechnologies.

Tsukuba praises not only the Nobel laureates, but also the research organizations, and is now one of the world's leading cities for science and technology. With a large number of worldwide research bases, Tsukuba is home to many researchers, students, and foreigners. As of November 1, 2012, the city was home to 7,167 people from 125 countries. There are 32 research institutes in Tsukuba, one-third of which are national organizations. In Technopolis, there are more than 20,000 government research institutions and freelance researchers are engaged in research (6, Dong-Ho Shin). World-wide research facilities include Japan's largest research room (Advanced Industrial Science and Technology) and the B-Factory Accelerator (High Energy Accelerator Research Organization), the largest research and cluster in Japan.

The University of Tsukuba has conducted in-depth clinical research since its inception using nuclear reactors. There has also been extensive research on the development of accelerator-based therapeutic devices that can be installed in hospitals, including peripheral equipment and control systems.

In particular, the following research has been carried out in this direction in the technology of Tsukuba in 2010-2019:

- Developed expensive therapeutic drugs that can be installed in hospitals (2010–2006).
- The Ibaraki Neutron Medical Rehabilitation Center was established as a joint research center (2011–2012).
- Animal experiments (2013).
- clinical trials (2014–2019).
- Accredited for Advanced Medical Care (2015).

V.CONCLUSION

Japan's unique way of developing an innovative economy through technopolis can be explained by:

1. Features of the Japanese approach to the concept of innovation.

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In Japan, the concept of innovative products is used in the first place in the world and has no analogues in other countries with high added value.

The equipment and technology imported into the country is not an innovation.

2. Concentration of clusters in the region of the research and production system of technopolis in the country.

Despite the fact that Japan's technopolis are more than 30 minutes away from major cities and high-speed trains are available, technopolis has modern homes and social infrastructure. The main objective is to save time for Japanese workers, who spend 57-60 hours a week at work, and to provide them with a place to stay and rest.

3. Development of separate strategic programs for the development of each technopolis and presence of a fixed specialization of technopolis;

The existence of such specialization allows not to duplicate research in one area and to develop the economy in different innovative directions.

4. High level of state interference in technopolis in production and social infrastructure (7, Sigmund).

As a rule, the state is the main reformer and investor in the process of innovation development. Since the creation of innovation is a combination of education, social infrastructure and research facilities, this process requires significant funding.

Japan's experience of innovative development through technopolis is the focus of scientific researchers and world economy. Implementation of the above-mentioned Technopolis model in Uzbekistan will also improve the activities of developing technology parks in the country. In particular, it is advisable to improve the activity of industrial parks in Uzbekistan on the following principles:

- To be the main reformer and investor in the formation and development of innovative economy;
- The result of local research, which is not produced on the basis of localization of innovative products;
- The need to import lab research equipment, not research products;
- The focus of primary, secondary and higher education on the implementation of coherent and interdisciplinary research.

REFERENCES

1. Michael I.Luger (1994). Science and technology in regional economic development: The role of policy in europe, Japan, and the United States// Technology in Society Volume 16, Issue 1, 1994, Pages 9-33
2. Kumadaa H., Matsumurab A., Sakuraia H., Sakaea T., Yoshiokac M., Kobayashic H., Matsumotoc H., Kiyanagid Y., Shibatae T., Nakashima H. (2014). Project for the development of the linac based NCT facility in University of TSukuba// Applied Radiation and Isotopes//Volume 88, June 2014, Pages 211-215
3. Pallavi Gupta Savita Shiwani Computer Science Department Suresh Gyan Vihar University India. "RECITAL INVESTIGATION OF IPv4 AND IPv6 USING WIRED NETWORKS IN OMNET++." International Journal of Communication and Computer Technologies 1 (2013), 106-110. doi:10.31838/ijccts/01.02.08

DOI: 10.37200/IJPR/V24SP1/PR201243
Received: 19 Jan 2020 | Revised: 08 Feb 2020 | Accepted: 27 Feb 2020

4. Yasuhiro Yasutomi (2010). Establishment of specific pathogen-free macaque colonies in TSukuba Primate Research Center of Japan for AIDS research// Vaccine//Volume 28, Supplement 2, 26 May 2010, Pages B75-B77
5. M. S. Neeharika, b. Jeevana jyothi (2015) chronotherapeutics: an optimizing approach to synchronize drug delivery with circadian rhythm. Journal of Critical Reviews, 2 (4), 31-40.
6. Mohamed Henini (1999). Tsukuba develops key role in Japan's research efforts// III-Vs Review// Volume 12, Issue 4, July–August 1999, Pages 38-41
7. Abe H., Alden J.D.(1988). Regional development planning in Japan // Reg. Studies. – Oxford etc., 1988. – Vol.22, N 5. – P.429–438.
8. Patel PB, Shastri DH, Shelat PK, Shukla AK. "Ophthalmic Drug Delivery System: Challenges and Approaches." Systematic Reviews in Pharmacy 1.2 (2010), 114-120. Print. doi:10.4103/0975-8453.75042
9. Dong-Ho Shin. (2002). Regional Innovation Systems of Tsukuba, Japan. A Paper Drafted for the 42nd Congress of the European Regional Science Association (ERSA) August 27-31, 2002. Dortmund, Germany
10. Zigmund A.A. Comparative analysis of the creation and development of technopolises in Japan and Russia. International Journal of Humanities and Natural Sciences, vol.10-no. 2. P.49-53.
11. Sunil Kumar, P., Dr. Sumithra, M.G., Sarumathi, M.(2016).Performance Analysis of Rayleigh Fading Channels in MIMO-OFDM Systems using BPSK and QPSK Modulation Schemes. The SIJ Transactions on Computer Networks & Communication Engineering (CNCE), 4(2), 1-6.
12. Dr.Karthika,D., &Dr.Gomathi, P.M. (2018). Analysis of Retinal Image Using Dynamic Histogram Equalization with Small Vessels Tracking and Reconstruction. *Journal of Computational Information Systems*, 14(4), 122 – 131.
13. Rouleau, N., Tessaro, L.W.E., Saroka, K.S., Scott, M.A., Lehman, B.S., Juden-Kelly, L.M., Persinger, M.A. Experimental evidence of superposition and superimposition of cerebral activity within pairs of human brains separated by 6,000 km: Central role of the parahippocampal regions (2015) NeuroQuantology, 13 (4), pp. 397-407.
14. Zhang, H., Zhao, J., Xu, C., Wang, P., Xing, Z., Wang, C. A REM intrusion model for death bed visions: A palliative nursing perspective (2014) NeuroQuantology, 12 (4), pp. 386-394.

DOI: 10.37200/IJPR/V24SP1/PR201243
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