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«5+1» COOPERATION FORMATS IN THE CENTRAL ASIAN REGION: ANALYSIS OF ECONOMIC INTERACTION WITH JAPAN

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Abstract. *The article analyzes Japan's economic interaction with Central Asia within the framework of the «5+1» format, which is a unique mechanism of multilateral cooperation that has attracted the attention of leading world powers in recent years due to the strategic importance of the region in the context of energy resources and transit routes. The research is based on a comprehensive analysis of investment, trade and economic relations between the countries of Central Asia and Japan. The main purpose was to identify key trends and factors that determine the dynamics of economic interaction and analyze the interrelations of economies. The hypotheses were tested using comparative statistics, dynamic analysis and graphical method, as well as using statistical methods, including calculation of correlation coefficients and multiple regression. Limitations of the study include the lack of data for some countries and periods. The analysis showed a moderate positive correlation between the GDP (Gross domestic product) of the countries of Central Asia and Japan, indicating economic interdependence. Japan's investment activity is manifested in significant investments in Kazakhstan and Kyrgyzstan, with recent growth in Tajikistan. Trade turnover between the countries fluctuates due to global and regional factors. Despite the positive correlation of economies, Central Asia's influence on Japan remains limited. Japanese investment plays a key role in the region's development, but political instability and domestic problems in the countries reduce their effectiveness. Trade also faces challenges, including customs barriers and infrastructure limitations.*

Keywords: *economic integration, «5+1» cooperation format, Central Asia, Central Asian region, Japan.*

Introduction. In recent years, Central Asia has attracted the attention of many countries, such as the United States, Russia, China, the European Union, South Korea, Japan, India, as well as the Gulf States, each of which has established its own «C5+1» framework for interaction with this region. There are several reasons for this interest. Central Asia, with its abundant energy resources, strategic position as a transit hub between Europe and Asia, and rapid economic growth, is emerging as a crucial player in the global energy market and an attractive destination for investors.

This year marks the 20th anniversary of the establishment of the «Central Asia + Japan» Dialogue, which was initiated in August 2004. This unique format of interaction between Japan and the five Central Asian countries (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan) has become an important tool for strengthening cooperation and promoting the prosperity of the region.

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The mutual interest of the Central Asian states and Japan in creating a strategic alliance and striving for more active economic cooperation was confirmed by the holding of the «Central Asia + Japan» Business Dialogue Forum in Astana on August 9, 2024.

Japan was chosen for the analysis of interaction with Central Asia in this article for several reasons. Firstly, Japan is one of the world's leading economies with sustainable interests in the region, which makes it an important partner for the Central Asian countries. It should be noted that the primacy of developing a new approach (the «C5+1» format) to this young region of the world belongs to Japan [1]. Secondly, Japan is actively investing in infrastructure projects and technologies, which creates significant opportunities for economic growth and modernization in Central Asia. Thirdly, Japan's «resource diplomacy» aimed at ensuring energy security plays an important role in its strategy of interaction with this region. Finally, Japan demonstrates a commitment to developing sustainable and long-term relations with Central Asia, which makes their analysis particularly relevant in the context of studying the prospects and challenges of economic cooperation.

Main provisions. The research examines the «5+1» format of cooperation between Central Asian countries and Japan, emphasizing the importance of economic interaction within it. Key findings include a moderate positive correlation between Central Asian and Japanese GDPs, indicating some economic interdependence. Japan's strategic interest in Central Asia is highlighted due to the region's energy resources, economic growth, and strategic location, as well as Japan's role in economic modernization and infrastructure development in the region. The study also highlights the role of Japanese investment in the region, especially in Kazakhstan and Kyrgyzstan, while facing various barriers and limitations in this direction. An analysis of trade turnover reveals unstable economic ties, with Kazakhstan maintaining stable trade relations, while other Central Asian countries demonstrate less consistent economic interaction with Japan.

Literature review. Modern studies of the region are complex, covering both internal processes in individual Central Asian states and their interaction with external players. The most popular forms of studying the region have become comprehensive publications in which the problems of the region are analyzed by experts specializing in relevant issues, including international collaborations. There are not many studies of multilateral formats designated by the formula «5+1». Among them, E.S.Alekseenkova can be singled out [2], who points to the accumulated experience of interaction between the Central Asian states with such major players as the United States, Russia, China, the European Union, South Korea, Japan and other countries. These interactions are based on the national interests of the partner countries. The author emphasizes the importance of the accumulated experience for the further development of cooperation within these multilateral formats.

The research conducted by Sh. Ashurov, Anwar Hassan Abdullah Osman, Romzi Bin Rosman, Razali Bin Kharon, and M. Yormirzoev [3, 4] primarily explores economic aspects such as FDI (Foreign Direct Investment) and labor productivity in Central Asian countries. The findings of Sh. Ashurov and colleagues suggest that to attract more FDI, the region should enhance economic stability, improve working conditions, promote trade openness, and reform tax policies. Their analysis, which covers data from 2000 to 2017, contrasts with other studies that consider a broader timeframe, including the post-Soviet era up to the present day. M. Yormirzoev's research reveals that, despite recent improvements, productivity levels in Central Asia remain significantly lower than in leading Asian nations. He stresses the importance of further studies to explore factors influencing economic growth, particularly the quality of work and the role of information technology. N. Murashkin and E. Varpahovskis [5, 6] examine the diplomatic strategies of Japan and South Korea in Central Asia, focusing on their development

models and how these models are perceived by Central Asian nations. They highlight Japan's often underestimated role in building infrastructure and economic ties in the region, which predates China's Belt and Road Initiative. In their joint study, Murashkin and Varpahovskis analyze how Japan and South Korea offer alternative modernization models to Western approaches, noting the challenges these models face due to the unique social and political contexts of Central Asia. T. Dadabaev [7, 8] investigates Japan's strategies in Central Asia, particularly its efforts to manage water resources and its involvement in Uzbekistan. His recent work [9] examines the history of Japanese corporate presence in the region, identifying logistical challenges and infrastructure deficits as major hurdles. S. Zhiltsov [10] focuses on Japan's post-Soviet foreign policy, particularly in securing access to natural resources like oil and gas. Lastly, F. Usmanov [11] and M. Rakhimov [12] explore Japan's role in post-conflict reconstruction in Tajikistan and the development of diplomatic relations between Japan and Central Asia, respectively, emphasizing Japan's positive image and its contributions to regional stability.

Thus, despite the general interest in the interaction between Japan and Central Asia, researchers focus on individual aspects of this interaction, from diplomacy and economic cooperation to regional security issues and post-conflict reconstruction.

This study contributes to the understanding of modern formats of economic interaction in Central Asia with the participation of Japan, analyzing the «5+1» format as a key format for dialogue and cooperation. It will assess Japan's economic interaction with the region and provide an idea of the prospects for further development of these relations. This analysis will help to better understand how Japan uses multilateral diplomatic platforms to advance its interests in Central Asia and strengthen economic ties with the region.

Methods and materials. The study is based on a comprehensive analysis of investment, trade and economic relations between the Central Asian countries and Japan, in order to identify key trends and factors that determine the dynamics of economic interaction in this region, as well as on the study of the relationship between the economies of the Central Asian countries and Japan using correlation and regression analysis. Our goal was to find out how the economies under study correlate with each other. The economic indicator GDP, one of the key indicators characterizing the development of any economy, and the trade turnover of the Central Asian countries with Japan were selected as variables. The relevant data for 1990-2023 for the selected GDP indicator for each country were collected based on World Bank Open Data, World Data Atlas. Statistical data on the volume of foreign trade turnover between Japan and Central Asian countries for 2003-2023 were collected from official statistical websites (Embassy of the Republic of Kazakhstan in Japan, National Statistical Committee of the Kyrgyz Republic, Agency of Statistics under the President of the Republic of Uzbekistan, The Observatory of Economic Complexity). Statistical data on the volume of foreign direct investment attracted from Japan to the Central Asian countries for 2013-2023 were collected from official statistical websites (National Bank of the Republic of Kazakhstan, National Bank of the Republic of Tajikistan, National Statistical Committee of the Kyrgyz Republic). Microsoft Excel was used to process statistical data. The following principles were taken into account when collecting data: openness, accessibility and transparency of statistical materials, comparability of data and results over time, which allows for correct comparisons.

The study was limited by the lack of official data on the volume of foreign direct investment attracted from Japan to Turkmenistan and Uzbekistan for the study period, data on the volume of Japan's foreign trade turnover with Tajikistan, as well as with Turkmenistan for 2023. Three hypotheses were put forward within the framework of the study:

Hypothesis 1: The GDP of the Central Asian countries (Kazakhstan, Kyrgyzstan, Turkmenistan, Tajikistan and Uzbekistan) and Japan are positively correlated. This may indicate economic interdependence, exposure to similar external factors, and the effect of joint projects and investments. It is expected that at least one of the variables (GDP of one of these countries) will have a significant impact on Japan's GDP.

Hypothesis 2: Changes in the economic and political situation affect Japan's investment activity in Central Asia.

Hypothesis 3: The foreign trade turnover of Central Asian countries with Japan has a significant impact on the GDP of Central Asia. It is expected that at least one of the variables (foreign trade turnover of Central Asian countries with Japan) will have a significant impact on the GDP of Central Asia.

The first hypothesis was tested by calculating paired correlation coefficients. It was previously found that there was multicollinearity between the variables (GDP of Central Asian countries), which made it difficult to assess and analyze the overall result. The second hypothesis was tested using comparative statistics, dynamic analysis and graphical method. The third hypothesis was tested by calculating the multiple correlation coefficient (multiple coefficient of determination R^2 - a statistical indicator that reflects the explanatory power of the regression f: Xj → Y), which reflects the joint influence of several independent variables on the dependent variable. In this case, there was no multicollinearity of independent variables. Calculations were made using the Microsoft Excel Data Analysis Package.

To calculate the paired correlation coefficients the following formula was used:

$$R_{xy} = \frac{\overline{x \cdot y} - \bar{x} \cdot \bar{y}}{s(x) \cdot s(y)} \quad (1)$$

where $\bar{x}$ is the average of the sample x; $\bar{y}$ is the average of the sample y; s(x) is the standard deviation of the sample x; s(y) is the standard deviation of the sample y.

A positive value of this correlation coefficient indicates a positive (direct) relationship between the variables, a negative value indicates a negative (inverse) relationship, and zero indicates no relationship. Their criteria are assessed using the Chaddock scale. If the absolute value of the correlation coefficient is $0.1 < rxy < 0.3$: the relationship is weak; if $0.3 < rxy < 0.5$: moderate; $0.5 < rxy < 0.7$: noticeable; $0.7 < rxy < 0.9$: high; $0.9 < rxy < 1$: very high.

To achieve the objective of the study, various general scientific methods of cognition (analysis, synthesis and generalization) were also used, which allowed to systematize and structure information on political and economic processes in the region, to highlight key aspects of interaction; methods of economic analysis (comparison, comparison) allowed to analyze some economic indicators, such as trade turnover, investments and GDP, and areas of cooperation; quantitative and qualitative study of the economic processes under consideration to assess statistical data and indicators. A qualitative study made it possible to understand the underlying causes and consequences of these processes.

Results and discussion. Japan, as one of the world's leading economies, has a strong interest in developing economic and political ties with Central Asia, viewing the region as strategically important in the context of ensuring energy security and expanding economic influence. For the Central Asian countries, economic cooperation with Japan opens up opportunities for diversifying their economies, attracting investment, and transferring advanced technologies, which are priority areas of their economic strategy. Deepening economic ties between Central Asia and Japan helps strengthen stability in the region, develop infrastructure, and improve the well-being of the population.

Table 1 presents the GDP indicators of the Central Asian countries (individually and as a whole) and Japan (in billion US dollars).

Japan's GDP is significantly larger than that of all Central Asian countries, which makes sense given the size of Japan's economy. Japan experienced robust growth in the 1990s but then experienced a long period of economic stagnation. Despite a partial recovery in the early 2000s, Japan's GDP has been declining again in recent years, highlighting the vulnerability of the Japanese economy to global and domestic shocks.

The dynamics of the GDP of the Central Asian countries varies depending on the specifics of each country and the current economic conditions. However, in general, the region, which includes Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan, has demonstrated economic growth in recent decades.

Japan is a highly developed industrial country with a diversified economy focused on high technology, automobile manufacturing and electronics production. While the economies of the Central Asian countries are mainly based on natural resource extraction, agriculture and, to a lesser extent, industry.

Table 1 - GDP of Kazakhstan, Uzbekistan, Kyrgyzstan, Turkmenistan, Tajikistan, Central Asia (in general) and Japan, 1990-2023 (US$ billion)

Years	Kazakhstan	Kyrgyzstan	Tajikistan	Turkmenistan	Uzbekistan	Central Asia	Japan	Years	Kazakhstan	Kyrgyzstan	Tajikistan	Turkmenistan	Uzbekistan	Central Asia	Japan
1990	26,93	2,68	2,60	3,00	13,36	48,57	3185,90	**2007**	104,85	3,80	3,72	12,66	22,31	147,35	4579,75
1991	24,92	2,57	2,55	2,95	13,68	46,67	3648,07	**2008**	133,44	5,14	5,16	19,27	29,55	192,56	5106,68
1992	24,92	2,32	1,91	3,20	12,94	45,29	3980,70	**2009**	115,31	4,69	4,98	20,21	33,69	178,88	5289,49
1993	23,41	2,03	1,65	3,18	13,10	43,36	4536,94	**2010**	148,05	4,79	5,64	22,58	49,77	230,83	5759,07
1994	21,25	1,68	1,52	2,56	12,90	39,91	4998,80	**2011**	192,63	6,20	6,52	29,23	60,18	294,76	6233,15
1995	20,37	1,66	1,23	2,48	13,35	39,10	5545,56	**2012**	208,00	6,61	7,63	35,16	67,52	324,92	6272,36
1996	21,04	1,83	1,04	2,38	13,95	40,24	4923,39	**2013**	236,63	7,34	8,45	39,2	73,18	364,80	5212,33
1997	22,17	1,77	0,92	2,45	14,74	42,05	4492,45	**2014**	221,42	7,47	9,11	43,52	80,85	362,37	4896,99
1998	22,14	1,65	1,32	2,61	14,99	42,70	4098,36	**2015**	184,39	6,68	8,27	35,80	86,20	321,33	4444,93
1999	16,87	1,25	1,09	2,45	17,08	38,73	4635,98	**2016**	137,28	6,81	6,99	36,17	86,14	273,39	5003,68
2000	18,29	1,37	0,86	2,90	13,76	37,19	4968,36	**2017**	166,81	7,70	7,54	37,93	62,08	282,05	4930,84
2001	22,15	1,53	1,08	3,53	11,40	39,69	4374,71	**2018**	179,34	8,27	7,76	40,77	52,87	289,01	5040,88
2002	24,64	1,61	1,22	4,46	9,69	41,62	4182,85	**2019**	181,67	9,37	8,30	45,23	60,28	304,86	5117,99
2003	30,83	1,92	1,56	5,98	10,13	50,42	4519,56	**2020**	171,08	8,27	8,13	45,82	60,22	293,53	5055,59
2004	43,15	2,21	2,08	6,84	12,03	66,31	4893,12	**2021**	197,11	9,25	8,94	50,01	69,60	334,91	5034,62
2005	57,12	2,46	2,31	8,10	14,31	84,31	4831,47	**2022**	225,50	12,13	10,71	56,54	81,14	386,03	4256,41
2006	81,00	2,83	2,83	10,28	17,33	114,28	4601,66	**2023**	261,42	13,99	12,06	59,89	90,89	438,25	4212,95

Note: compiled by the authors based on [13]

Figure 1 presents a visualization of the data in Table 1 in the form of a diagram.

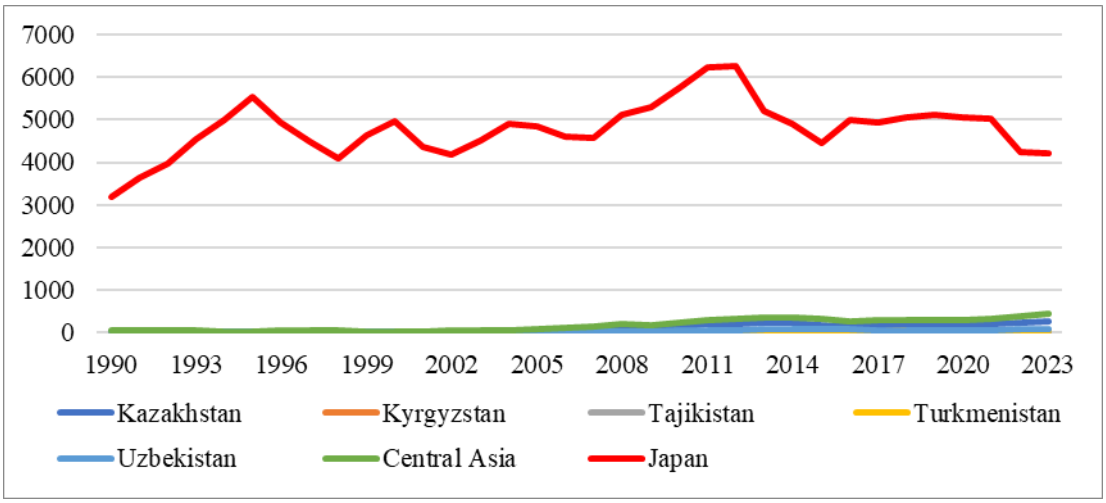

Figure 1 - Dynamics of GDP changes in Kazakhstan, Uzbekistan, Kyrgyzstan, Turkmenistan, Tajikistan, Central Asia (in general) and Japan, 1990-2023

Note: compiled by the authors based on Table 1.

To test Hypothesis 1, a correlation analysis was conducted (calculation of paired correlation coefficients using formula (1)) based on the initial data from Table 1, where the dependent variable is: Japan's GDP – y; dependent variables are: Kazakhstan's GDP – x_1; Kyrgyzstan's GDP – x_2; Tajikistan's GDP – x_3; Turkmenistan's GDP – x_4; Uzbekistan's GDP – x_5; time period (34 years): 1990-2023. The matrix of paired correlation coefficients is in Table 2.

The cross-correlation between Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan is very high (close to 1), indicating a strong positive linear relationship between them (multicollinearity). This may indicate a high degree of economic, political or cultural integration between them.

Table 2 - Matrix of paired correlation coefficients between the GDP of Central Asian countries and the GDP of Japan

		Japan	Kazakhstan	Kyrgyzstan	Tajikistan	Turkmenistan	Uzbekistan
		y	X_1	X_2	X_3	X_4	X_5
Japan	y	1	0,4060	0,1963	0,2708	0,2940	0,3268
Kazakhstan	X_1	0,4060	1	0,9311	0,9764	0,958	0,939
Kyrgyzstan	X_2	0,1963	0,9311	1	0,9764	0,9797	0,9068
Tajikistan	X_3	0,2708	0,9764	0,9764	1	0,9866	0,9558
Turkmenistan	X_4	0,2940	0,958	0,9797	0,9866	1	0,9463
Uzbekistan	X_5	0,3268	0,939	0,9068	0,9558	0,9463	1
Note: compiled by the authors based on calculations according to Table 1.							

The correlation rates with Japan's GDP are positive, but they are not high. This suggests that there is a moderate positive correlation between Japan's GDP and the GDP of each of the Central Asian countries.

Hypothesis 1, which states that the GDPs of Central Asian countries and Japan are positively correlated with each other, is confirmed, but it should be noted that these correlations are quite weak, i.e. economic growth in these countries probably does not have a significant impact on the Japanese economy. The expectation that at least one of the variables (the GDP of

one of these countries) will have a significant impact on Japan's GDP is not confirmed. The lack of a high correlation between them can be explained by the difference in the economic interests and structures of the economies of Central Asian countries and Japan. As a result of the fact that Japanese products contain high added value and are therefore expensive compared to low-tech Central Asian products, we obtained a weak correlation.

The differences in economic structure not only highlight the complementarity of the economies of Central Asia and Japan, but also explain Japan's interest in the economic development of this region. Japanese investments and projects play a key role in strengthening economic ties with Central Asia, although they are relatively limited compared to other regions, which reduces the degree of economic interdependence. With the growing need of the countries in the region to modernize infrastructure, diversify their economies, and improve social standards, Japan views Central Asia as a strategically important region for realizing its investment and trade interests.

Moving from the analysis of macroeconomic indicators such as GDP to the consideration of Japan's investment activity in Central Asia, we note the obvious fact that stable economic cooperation between countries requires significant financial injections, especially in such areas as infrastructure, energy and technology [14]. Consideration of investments from Japan in Central Asia will allow us to more fully assess the impact of Japanese capital on the economic development of the region and the prospects for further cooperation.

Table 3 and Figure 2 present data on the volume of direct foreign investment directly from Japan to Kazakhstan, Kyrgyzstan, Tajikistan for 2013-2023 and their dynamics, respectively. Data for Turkmenistan and Uzbekistan were not available, which made it difficult to conduct a more in-depth analysis.

Table 3 - Foreign direct investment (FDI) from Japan to Kazakhstan, Kyrgyzstan, Tajikistan, 2013-2023 (US$ thousand)

Years	Japanese FDI in Kazakhstan	Japanese FDI in Kyrgyzstan	Japanese FDI in Tajikistan
1	2	3	4
2013	317 885,70	2 880,90	22,90
2014	217 963,94	128,20	-
2015	390 170,19	1 607,10	-
2016	454 913,79	6 013,30	10,70
2017	138 011,17	20 655,60	-
2018	7 384,94	653,00	-
2019	38 524,05	6 316,10	-
2020	55 876,42	927,00	-
2021	-204 695,46	761,90	-
2022	-54 490,32	78 878,20	3473,80
2023	-14 540,66	9 368,50	9123,60
Notes: 1) compiled by the authors based on sources [15–17]; 2)data on the volume of foreign direct investment attracted from Japan to Turkmenistan and Uzbekistan are not available.			

Figure 2 presents a visualization of the data in Table 3 in the form of a diagram.

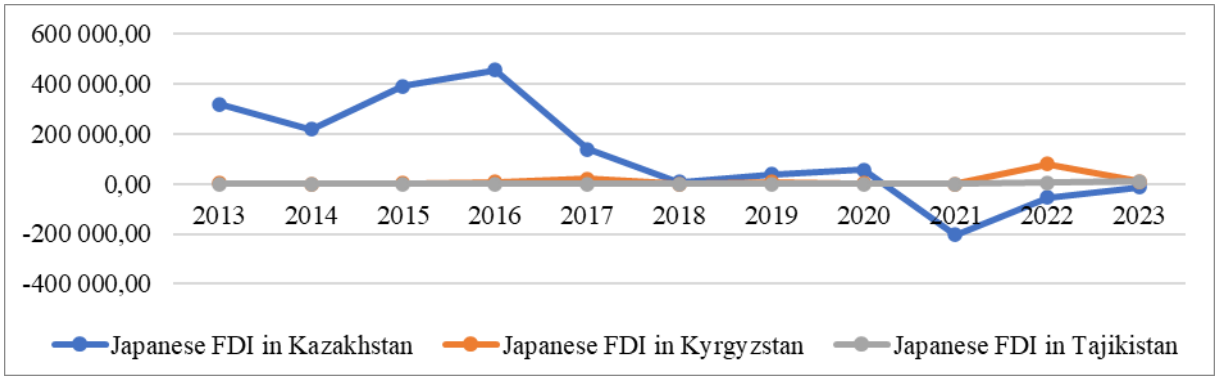

Figure 2 - Dynamics of changes in FDI volumes from Japan to Kazakhstan, Kyrgyzstan, Tajikistan, 2013-2023, (US$ thousand)

Note: compiled by the authors based on Table 3.

Kazakhstan experienced a significant influx of Japanese investment, peaking in 2015-2016 with FDI reaching $454.9 million, primarily due to projects in the energy and infrastructure sectors, but investment sharply declined after 2017, with negative values in 2021-2023, likely due to economic instability, changes in the investment climate, and the completion of large projects, despite Japan being a major investor with over $7.7 billion invested since 1993 and around 70 enterprises operating in Kazakhstan (Mareven Food, Tokyo Rope, Cokey Systems, NYK Group, Marubeni Corporation, Mitsubishi Corporation, etc.). To attract further investment, improvements in the legal system, transparency, and infrastructure are needed, especially in light of regional conflicts and sanctions that have recently deterred foreign investment. Unfortunately, regional conflicts, sanctions imposed on Russia and negative growth prospects have recently discouraged foreigners from investing in the region.

In Kyrgyzstan, Japanese FDI has been modest compared to Kazakhstan, with notable fluctuations such as a peak in 2017 at $20.6 million and a sharp rise to $78.9 million in 2022, largely due to specific projects and economic ties, but overall investment is hampered by challenges like weak infrastructure, political instability, and governance issues, despite the presence of about 40 joint Kyrgyz-Japanese ventures across various sectors.

In Tajikistan, Japanese FDI was low and irregular from 2013 to 2016, but has significantly increased since 2022, reaching US$9,123.6 thousand in 2023, possibly indicating new investment initiatives, while the country continues to face challenges such as geopolitical tensions, low private sector productivity, and limited growth opportunities, despite ongoing JICA projects and the presence of the Japanese company «Avvalin» in Dushanbe («Cokey Systems» concern).

Uzbekistan hosts over 10 joint ventures with Japanese investment, including one fully owned by Japanese capital, and representative offices of 15 Japanese companies, such as Marubeni, Mitsubishi Motors, Japan Oil, Gas and Metals National Corporation (JOGMEC), Toyota Tsusho, Itochu, Isuzu Motors Ltd. and others, while successful collaborations like that between JSC «Uzavtosanoat» and Isuzu have produced thousands of buses and trucks, with new natural gas-powered models now in production; despite active efforts to improve the investment climate, Uzbekistan faces challenges like administrative opacity, corruption, and the need for economic diversification, which hinder the inflow of foreign direct investment, though Japan continues to support the country with over $3.7 billion in joint projects and a focus on infrastructure and human resource development through JICA.

Japan is Turkmenistan's largest investor, contributing 41% of the country's foreign investment, with Japanese companies undertaking 38 projects worth over $11 billion, resulting in the construction of significant industrial facilities, including a gas chemical complex for the production of ammonia and carbamide in Garabogaz, a polymer plant in Kiyanli, a plant for the production of gasoline from natural gas in Ovadandepe and a gas turbine power plant in the Chardjevsky etrap of the Lebap Velayat. Despite challenges like tight government control, limited access to resources, and a lack of transparency, Japan and Turkmenistan are strengthening their economic ties, as evidenced by the recent business forum in Tokyo and the signing of a Memorandum of Cooperation between Turkmenistan and the Japan External Trade Organization (JETRO).

An analysis of Japan's investment in Central Asian countries has shown that this aspect of cooperation plays an important role in the region's economic relations with Tokyo. Japanese investment, especially in strategically important sectors such as infrastructure, energy and technology, contributes not only to the economic growth of individual countries in the region, but also to the elevation of bilateral relations to a higher level. The analysis confirms Hypothesis 2 that changes in the economic and political situation affect Japan's investment activity in Central Asia.

However, investment is only one aspect of economic interaction between Japan and Central Asia. Trade turnover is also a key component of these relations. A study of the volume and structure of trade between Japan and the Central Asian countries (Table 4, Figures 3) allows us to better understand the region’s economic integration with global markets and identify areas for further strengthening of economic ties. Trade turnover, including the export and import of goods, reflects not only current needs and offers, but also the strategic interests of the parties, as well as their ability to adapt to changes in the global economy.

Table 4 - Japan's foreign trade turnover with Central Asian countries, 2003-2023, US$ million

Years	Kazakhstan-Japan	Kyrgyzstan-Japan	Turkmenistan-Japan	Uzbekistan-Japan
2003	334,00	27,30	28,54	134,50
2004	410,20	5,85	51,56	133,70
2005	659,00	10,04	15,11	155,00
2006	992,00	15,50	52,10	195,10
2007	1 009,00	27,79	91,17	225,20
2008	1 286,00	29,27	76,07	386,90
2009	584,00	22,78	26,73	188,80
2010	960,00	44,78	24,69	249,80
2011	1 516,00	99,32	271,67	286,30
2012	1 846,00	100,18	121,02	204,00
2013	1 419,00	258,13	54,70	215,20
2014	1 482,00	185,64	58,50	190,39
2015	1 350,00	60,82	25,80	255,66
2016	1 050,00	18,87	397,00	264,09
2017	1 305,00	34,74	81,21	166,21
2018	1 964,00	48,71	16,30	707,54
2019	1 394,00	25,65	11,87	419,68
2020	1 114,00	22,70	116,00	209,75
2021	1 003,00	18,78	36,74	170,64
2022	1 609,00	93,32	49,63	233,50
2023	2 100,00	255,75	н/д	236,82
Notes: 1) compiled by the authors based on the source [18]; 2) data on the volume of Japan's foreign trade turnover with Tajikistan, as well as with Turkmenistan for 2023 are not available.				

To test Hypothesis 3, a correlation and regression analysis was conducted based on the initial data from Tables 1 and 4, where the dependent variable is: GDP of Central Asia – y; dependent variables are: Japan's foreign trade turnover with Kazakhstan – x_1; with Kyrgyzstan – x_2; with Turkmenistan – x_3; with Uzbekistan – x_4; there is no publicly available data on Tajikistan, as well as with Turkmenistan for 2023; time period (21 years): 2003-2023. The results are presented in Table 5.

Table 5 - Regression analysis results for testing Hypothesis 3

Regression statistics	
Multiple R	0,866548
R-square	0,750906
Normalized R-square	0,688632
Standard Error	61,88895
Observations	21

Analysis of variance (ANOVA)					
	df	*SS*	*MS*	*F*	*F-significance*
Regression	4	184743,05	46185,761	12,058183	0,0001039
Remainder	16	61283,875	3830,2422		
Total	20	246026,92			

	Coefficients	*Standard error*	*t-statistics*	*P-Value*	*Lower 95%*	*Upper 95%*	*Lower 95%*	*Upper 95%*
Y-intercept	41,513	40,748	1,019	0,323	-44,869	127,896	-44,869	127,896
Variable X1	0,195	0,052	3,752	0,002	0,085	0,305	0,085	0,305
Variable X2	0,221	0,278	0,797	0,437	-0,368	0,811	-0,368	0,811
Variable X3	0,071	0,151	0,470	0,645	-0,249	0,391	-0,249	0,391
Variable X4	-0,175	0,153	-1,144	0,269	-0,499	0,149	-0,499	0,149

The multiple correlation coefficient R is 0.866548. This value indicates a strong correlation between the dependent variable (Central Asia's GDP) and the independent variables (foreign trade turnover with four countries). The multiple determination coefficient R^2 is 0.750906, i.e. the model explains about 75.09% of the variation in the dependent variable. This is a fairly high figure, indicating a good fit of the model to the data. After adjusting for the number of independent variables, the model explains about 68.87% of the variation in the dependent variable. This confirms that the model adequately describes the data. The statistical significance of the model is confirmed by the F-significance - 0.0001039 (below the threshold of 0.05). This confirms that the regression model as a whole is significant and that the relationship between the independent variables (foreign trade turnover) and the dependent variable (GDP) exists.

Hypothesis 3, that the foreign trade turnover of Central Asian countries with Japan has a significant impact on the GDP of Central Asia, is partially confirmed. In particular, variable X_1 (trade turnover of Kazakhstan with Japan) has a significant impact on the GDP of Central Asia, which is confirmed by its statistical significance (coefficient 0.195, p-value

0.002<0.05). However, other variables (X_2, X_3 and X_4 – trade turnover of Kyrgyzstan, Turkmenistan and Uzbekistan with Japan) don't have a significant impact on GDP within this model. This may indicate that certain aspects of foreign trade turnover do affect GDP, but the overall effect is not distributed evenly among all factors.

Trade turnover between Japan and Central Asian countries is characterized by significant fluctuations, which may be due to various economic, political and market factors. Trade volumes may be affected by global economic conditions, changes in prices of exported goods and the development of new trade agreements. In 2023, there is a tendency for trade turnover to increase with Kazakhstan and Kyrgyzstan, which may indicate the resumption of economic cooperation and strengthening of trade ties.

Kazakhstan's imports from Japan mainly include automobiles, construction machinery, rubber products such as tires, and various types of equipment including forklifts and vehicle components. Kazakhstan's exports to Japan, in turn, mainly include raw materials such as ferroalloys, crude oil, unwrought aluminum, and tantalum. These commodity flows reflect the specifics of the two countries' economies, with Japan supplying high-tech products and Kazakhstan exporting natural resources and metals.

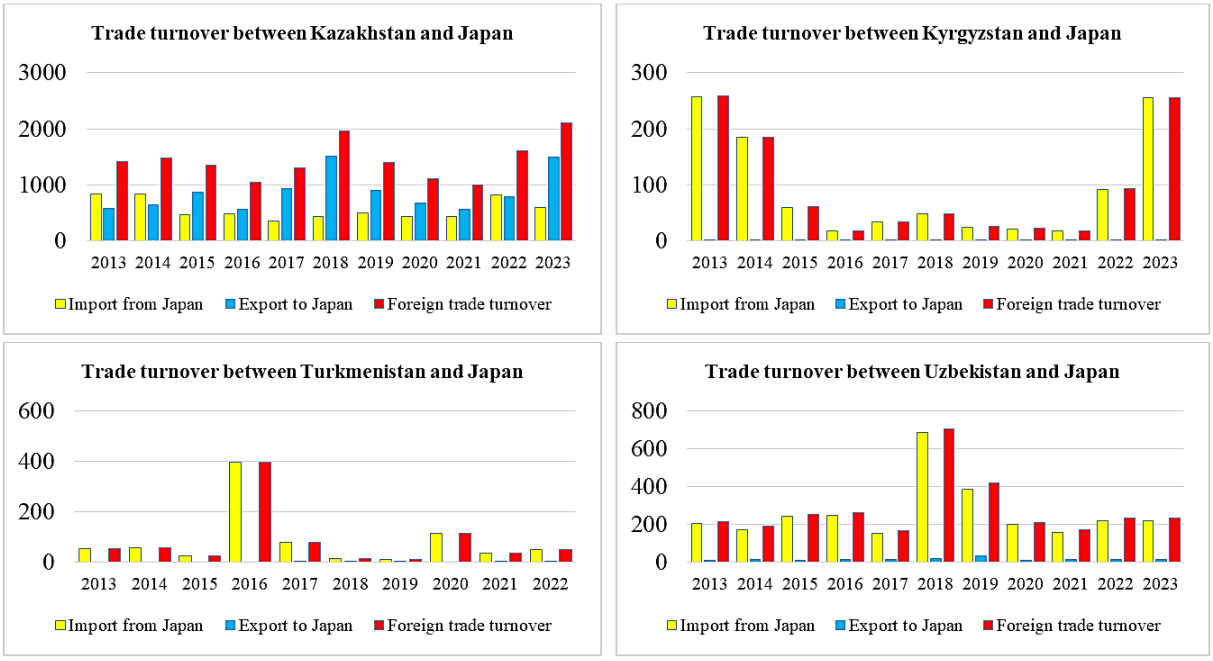

Figure 3 - Dynamics of changes in exports, imports and foreign trade turnover between Kazakhstan, Kyrgyzstan, Turkmenistan, Uzbekistan and Japan, 2013-2023, US$ million

Notes: 1) compiled by the authors based on the source [17–20]; 2) data on the volume of Japan's foreign trade turnover with Tajikistan, as well as with Turkmenistan for 2023 are not available.

The main goods that Kyrgyzstan imports from Japan are automobiles and auto parts, engineering products including construction equipment, and electrical products. These goods correspond to the import structure typical of a country with a growing demand for high-quality technology and vehicles. On the other hand, Kyrgyzstan's exports to Japan mainly include raw materials such as gold and metal ores. Agricultural products and mineral resources also make up a significant part of the exports, reflecting Kyrgyzstan's natural and economic features.

Turkmenistan mainly imports machinery and mechanical equipment, electrical equipment, and vehicles from Japan. These products meet Turkmenistan's needs for upgrading its industrial and transport infrastructure. Turkmenistan's exports to Japan, although small, are concentrated on mineral fuels, including natural gas and oil. In addition, Turkmenistan also exports nitrogen fertilizers and cotton, which play an important role in the country's economy.

The main products that Uzbekistan imports from Japan are gas turbines, trucks and auto parts. At the same time, Uzbekistan exports to Japan such products as office machine parts, potash fertilizers and raw aluminum products.

According to various sources, Tajikistan exports to Japan mainly raw materials such as aluminum and cotton, which are the country's main export products. Agricultural products and textiles may also be exported. The main imports from Japan to Tajikistan include automobiles, machinery, electronics, and various industrial goods. The trade balance between the countries usually shows a deficit for Tajikistan, as imports from Japan significantly exceed exports.

Conclusion. In recent decades, Central Asia has become an important focus of international attention, and Japan occupies a special place among the countries actively interacting with this region. The «Central Asia + Japan» Dialogue, launched in 2004, is a unique format of cooperation aimed at strengthening economic ties, political dialogue and ensuring stability in the region. The analysis of various aspects of this cooperation presented in this article allows us to better understand its importance and prospects.

The main focus was on three key hypotheses related to the economic interrelationship of these countries.

One of the key findings of the study is the confirmation of the hypothesis of a positive correlation between the GDP of Central Asian countries and Japan. Although the levels of correlation between individual countries and Japan vary, the overall trend points to a moderate positive relationship. This finding highlights a certain degree of economic interdependence between the regions, although it shows that the impact of Central Asian economic growth on Japan remains limited.

Japan's investment activity in Central Asia also plays an important role in bilateral relations. The analysis showed that Kazakhstan and Kyrgyzstan have seen significant Japanese investment flows, especially in the energy and infrastructure sectors. In Tajikistan, although Japan's investment activity was previously low, there has been a significant increase in recent years, which may indicate the expansion of economic ties. However, political and economic instability in the region, as well as specific domestic problems in the countries, such as a weak legal framework and unacceptable levels of corruption, may have a negative impact on the inflow of direct investment.

The study also reveals the importance of Japan's foreign trade turnover with Central Asia. However, this effect is unevenly distributed among the countries in the region, meaning that not all countries contribute equally to this process. Trade turnover between Japan and the Central Asian countries shows significant fluctuations, reflecting the influence of global and regional economic factors. While trade between Japan and Kazakhstan remains stable and significant, other countries in the region, such as Kyrgyzstan and Uzbekistan, show less stable trade ties. This may be due to differences in economic structures, levels of technological development, and dependencies on foreign trade. In addition, the Central Asian countries face difficulties in accessing the Japanese market due to high customs duties and complex procedures for importing goods, including within the framework of sanctions. On the other hand, Japan also faces certain problems when trying to enter the Kazakhstan market due to the specifics of local legislation and regulation, especially as a member state of the Eurasian Economic Union. However, the very fact of significant turnover emphasizes the strategic

importance of these trade relations. In the long term, deepening economic ties between Central Asia and Japan requires further efforts to improve the investment climate and develop trade and economic cooperation.

In the context of the ongoing economic and political development of the region, Japan seeks to use the «5+1» format as a platform to expand its influence and ensure sustainable development in Central Asia. At the same time, the countries of the region view Japan as an important partner for diversifying their economies, attracting investment and modernizing infrastructure. However, in order to increase the pace of economic cooperation, including investment, it is necessary to solve a number of problems related to insufficiently developed infrastructure, political instability, corruption, non-transparent regulatory system, and unstable legal framework.

Based on the conducted research, it can be concluded that there is a huge potential for economic cooperation between the Central Asian countries and Japan, especially in the field of attracting high-quality investments and implementing joint innovative projects. This is confirmed by the signing of a number of documents on deepening cooperation in various sectors of the economy within the framework of the «Central Asia + Japan» Dialogue business forum. This highlights the importance of further research and the need for a deeper analysis of the interconnections in order to understand the multifaceted economic interactions between the Central Asian countries and Japan. Subsequent work may expand the results obtained by adding other countries of the «5+1» format as the object of research.

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«5+1» ФОРМАТЫНДАҒЫ ОРТАЛЫҚ АЗИЯ АЙМАҒЫ: МӘСЕЛЕЛЕРІ МЕН ЭКОНОМИКАЛЫҚ ЫНТЫМАҚТАСТЫҚТЫҢ КЕЛЕШЕГІ

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Түйін. *Мақалада, соңғы жылдары энергетикалық ресурстар мен транзиттік маршруттар контекстінде өңірдің стратегиялық маңыздылығына байланысты жетекші әлемдік державалардың назарын аударатын көпжақты ынтымақтастықтың бірегей тетігі болып табылатын, "5+1" форматы шеңберінде Жапонияның Орталық Азиямен экономикалық өзара іс-қимылы талданады. Зерттеу Орталық Азия мен Жапония елдерінің инвестициялық және сауда-экономикалық қатынастарын кешенді талдауға негізделген. Негізгі мақсат - экономикалық өзара іс-қимыл динамикасын анықтайтын негізгі тенденцияларды, факторларды анықтау және экономикалардың өзара байланысын талдау болып табылады. Қойылған гипотезаларды тексеру салыстырмалы статистика, динамикалық талдау және графикалық әдіс арқылы, сонымен қатар статистикалық әдістерді қолдану арқылы корреляция коэффициенттерін есептеу және үлкен жиынды регрессия арқылы жүргізілді. Кейбір елдер мен кезеңдер бойынша деректердің болмауын зерттеудің шектеулерін қамтиды. Талдау Орталық Азия мен Жапония елдерінің ЖІӨ арасындағы орташа оң корреляцияны көрсетті, бұл экономикалық өзара тәуелділіктің болуын көрсетеді. Жапонияның инвестициялық белсенділігі Қазақстан мен Қырғызстанға қомақты инвестицияларда, жақында Тәжікстанда өсуімен көрінеді. Елдер арасындағы сауда айналымы жаһандық және аймақтық факторларға байланысты ауытқуларды көрсетеді. Экономикалардың оң корреляциясына қарамастан, Орталық Азияның Жапонияға әсері шектеулі болып қала береді. Жапондық инвестициялар аймақтың дамуында шешуші рөл атқарады, бірақ елдердің саяси тұрақсыздығы мен ішкі проблемалары олардың тиімділігін төмендетеді. Сонымен қатар кедендік кедергілер мен инфрақұрылымдық шектеулерді қоса алғанда, саудның дамуына қиындықтар тұғызады.*

Түйін сөздер*: экономикалық интеграция, «5+1» ынтымақтастық форматтары, Орталық Азия, Орталық Азия аймағы, Жапония.*

ФОРМАТЫ СОТРУДНИЧЕСТВА «5+1» В ЦЕНТРАЛЬНО-АЗИАТСКОМ РЕГИОНЕ: АНАЛИЗ ЭКОНОМИЧЕСКОГО ВЗАИМОДЕЙСТВИЯ С ЯПОНИЕЙ

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Резюме. *В статье анализируется экономическое взаимодействие Японии с Центральной Азией в рамках формата «5+1», который представляет собой уникальный механизм многостороннего сотрудничества, в последние годы привлекающий внимание ведущих мировых держав, в связи со стратегическим значением региона в контексте энергетических ресурсов и транзитных маршрутов. Исследование основано на комплексном анализе инвестиционных и торгово-экономических отношений стран Центральной Азии и Японии. Основной целью было выявление ключевых тенденций и факторов, определяющих динамику экономического взаимодействия, и анализ взаимосвязей экономик. Проверка поставленных гипотез проводилась с помощью сравнительной статистики, динамического анализа и графического метода, а также с использованием статистических методов, включая расчёт коэффициентов корреляции и множественную регрессию. Ограничения исследования включают отсутствие данных по некоторым странам и периодам. Анализ показал умеренную положительную корреляцию между ВВП стран Центральной Азии и Японии, что указывает на наличие экономической взаимозависимости. Инвестиционная активность Японии проявляется в значительных вложениях в Казахстан и Кыргызстан, с недавним ростом в Таджикистане. Торговый оборот между странами демонстрирует колебания, что связано с глобальными и региональными факторами. Несмотря на положительную корреляцию экономик, влияние Центральной Азии на Японию остается ограниченным. Японские инвестиции играют ключевую роль в развитии региона, но политическая нестабильность и внутренние проблемы стран снижают их эффективность. Торговля также сталкивается с трудностями, включая таможенные барьеры и инфраструктурные ограничения.*

Ключевые слова*: экономическая интеграция, форматы сотрудничества «5+1», Центральная Азия, Центрально-Азиатский регион, Япония.*

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