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Structural shifts in the economy of the Republic of Kazakhstan

Abstract. *Structural shifts in the economy are an objective phenomenon in the world economy. This process is experienced by all countries without exception, but the causes, intensity and consequences of structural changes vary from country to country. The article is devoted to the study of structural shifts, theoretical concepts that determine their nature, intensity, and consequences for the economy. The article analyzes the structural changes in Kazakhstan based on the analysis of the indices of structural shifts, their elasticity. It is revealed that during the period of independence in the Republic of Kazakhstan there were structural changes that led to the process of deindustrialization of the economy and a decrease in its efficiency. Reducing the share of manufacturing in the total gross domestic product, increasing the share of services, with their technological simplification. The main conclusion of the study is that the quality of structural changes in the economy of the Republic of Kazakhstan has pushed the economy back and made the economy less productive*

Keywords: *structure of the economy, structural shifts, the index of structural changes, the structure of GDP, technological structure, production.*

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Introduction

The issues of structural adjustment in the Republic of Kazakhstan have always been the subject of research by many economists, since the efficiency of the economy depends on how optimal the structural proportions in the economy are. Today, the country's economy is not represented by an effective structure, which has undergone significant changes over the past years of independence. In order to reverse this situation, it is necessary to apply a number of measures of an investment and monetary nature. In addition, it is necessary to understand the reasons, factors and consequences of structural changes that will allow this policy to be formed.

Structural transformations (shifts) are defined as a process in which there is a change in proportions due to changes in labor productivity, final results, and the relationship of various structural elements. If we describe structural transformation as a structural shift, it includes changes in the proportions between the various elements of the national economy. In general, structural shifts correspond to the category of the macro level, but they also manifest themselves at the macro level, meso- and micro-levels [1].

In the economic process, structural shifts are usually compared with concepts such as: cycles and fluctuations. Theories that have been the subject of changes in the structure of the economy are presented in a wide range. Studies show that

the structural transformations that occur in the economy have a significant connection with the cycles described by D. N. Kondratiev. The cycles of D. N. Kondratiev described in his model have almost identical points both in time and in the direction of changes. Cycles of Kondratiev D. N., including downward and upward waves, at the points of minimum and maximum reflect the process of structural shifts and the most important changes in the structure of the world economy and a number of countries. [2]. In more detail, the issues of structural shifts were studied and disclosed by O. Y. Krasilnikov, who pointed out that “structural shifts are understood as a qualitative change in the relationships between comparable elements of the macroeconomic system, due to the uneven dynamics of the ratio of their quantitative characteristics.” [3] No less significant research in the field of structural transformations is presented in the works of Yakovets Yu. V., Sukharev O. V.

Although many economists have argued that the distinctive feature of the concept of structural change is the presence of changes in the needs of economic entities and the distribution of economic resources, it should be noted that not everything can be applied to cycles. Economic cycles, in most cases, act as a system that consists of several multidirectional structural changes. The next characteristic feature inherent in structural shifts is the irreversibility of development through changes in the economic structure. However, this statement is controversial among some economists. Since some of them adhere to the opposite opinion, because structural changes are considered as some reflection of cyclical processes in the economy. It should be noted that the shift itself is not a reflection, because it is a certain number of multidirectional shifts that cause the economic cycle. Structural shifts are expressed through changes in the position of quantitative characteristics of the economic system elements, shares and proportions [4].

The leading factor in the transformation of the structure of the economy are technological changes caused by scientific and technological progress. And they modify and modernize the economic structure, creating new industries

and sectors of the economy. It is the appearance and development of new sectors of economy that produce innovative goods and services that contribute to the dynamic growth of the economy, as well as its further sustainable growth [5].

There are different concepts of technological structures in economic science. However, the most famous concepts were developed by such theoretical economists as A.GB. Fisher, C. Clark, J. Fourastie, W. Rostow, D. Bell and A. Toffler. Here below table 1 demonstrates the main concepts of their theories.

It should also be noted that Clark, in his works showed the relationship of the level of economic development and the technological structure of industry. Highly developed countries, namely Japan, USA and Western Europe actually had a large proportion of high-tech industries, it should be noted that their specific gravity was more than 50% [14].

At the same time, developing countries (China, India, Latin America and Central Europe) had a large proportion of low-tech but labor-intensive industries, mainly textile and food industries. Thus, we can say that those industries that relied on low- or medium-low-level technologies have pleased the demand for primary resources.

As we can see, the general technological level of the economy is determined by the technological structure of industry. That is, the technological process originates in industry, and then receives further development in other sectors of the economy. This implies the key role of industry for sustainable dynamic economic development.

Methodology

Since gaining independence, the economy of Kazakhstan has undergone considerable changes. As a result, the ongoing changes in the economy are shifting the priorities of the structure of reproduction. In particular, the priorities of economic sectors, the distribution of national income and foreign trade of the country are shifting. A positive characteristic of any structure is its elasticity. Changes in the structure of the economy can occur under the influence of external and internal factors. It all depends

on existing global economic trends and on the flexibility of the applied policy, as well as how adaptive economy.

Shifts and changes in the structure of the economy can show how much the economy is provided with scientific and technical conditions and what achievements it has achieved over a certain period. They also show how satisfied the portability of society is. Today, the main priority of structural economies is the «reindustrialization» of the economy. It involves the use of fundamentally new resource and energy-saving, as well as environmentally friendly technologies. Stimulates an increase

in the quality of products and technical and economic parameters of production. Participates in the prospective development of knowledge-intensive industries and increase their share in GDP. The implementation of the tasks for the realization of «reindustrialization» primarily depends on the adopted structural policy, and its investments component.

As with the study of any economic object, structural changes can be measured in quantitative and qualitative measures. In the first case, the analysis is carried out using quantitative data, the influence of structural changes on the topics of economic growth is considered. The second

Table 1

The concepts of technological structures in economic science

Author	Concept	Basic Idea
Allan George Barnard Fisher	Three-sector model (theory of sectors, theory of structural changes by Fisher – Clark, model of Clark – Fisher)	Primary sector (extraction of raw materials, agriculture, mining, fishing and forestry). Secondary sector (industrial production and construction). Tertiary sector (services, education and tourism)
Colin Grant Clark		The impact of technology, institutions and history on socio-economic development. He presents a «hypothesis» about the long-term dynamics of economic systems. Its starting point is technological development and its impact over time in the economy, characterized by population growth.
Jean Fourastie		
Walt Whitman Rostow	Rostow's stages of growth	Society becomes a modern industrial economy in the following stages: 1) traditional society, 2) preconditions to take-off, 3) take-off, 4) drive to maturity 5) age of high mass consumption and 6) beyond consumption
Daniel Bell	The concept of post-industrial (informational) society	Postindustrial society is based on the growing importance of the information sector. Like others, in his opinion, it consisted of three components: the transition from production to services in the economy, the fame of new high-tech industries, the growth of new technical elites and the new principle of social stratification. He regarded this as a «transition from a society producing goods to a society of information or knowledge». According to Bell, the formation of the information society is a planned process.
Alvin Toffler		New electronic and communication technologies are an indicator of structural changes in modern society. According to Toffler, the main point in the formation of the information society is the crisis of civilization; as a result, society cannot develop on an outdated basis.
Note – compiled by author according to the source [6–13]		

method consists in a deeper understanding of the existing relationships between the effectiveness of the national economy and its structure.

In order to show and justify the structural changes that have occurred, it is necessary to study the main factors of change, establish the relationship of structural changes with indicators of efficiency and dynamics of the country's national economy. Using the following indicators allowed us to quantify the changes in the sectors of the structure of the economy.

A general indicator of the structure is the proportion expressed in relative values, usually a percentage:

$$d_i = \frac{x_i}{S} * 100\%, S = \sum_{i=1}^N x_i, \quad (1)$$

where d_i – fraction of the i th element of the structure, ;

x_i – value of the absolute i th indicator;

S – total value of the sum of the absolute values of i -indicators.

The condition for the adequacy of the calculations is =100%.

Next, we used linear coefficients of absolute and relative differences of structures.

$$LA(f_2 - f_1) = \frac{\sum_{i=1}^n |f_2 - f_1|}{n}, \quad (2)$$

where $LA(f_2 - f_1)$ – linear coefficient of absolute structural shifts;

$|f_2 - f_1|$ – absolute value of the increase in the specific gravities of individual parts of the whole in the current period compared with the base;

– number of structural parts.

$$LR\left(\frac{f_2}{f_1} - 1\right) = \frac{\sum_{i=1}^n \left|\frac{f_2}{f_1} - 1\right|}{n}, \quad (3)$$

where $LR(f_2 - f_1)$ – linear coefficient of relative structural shifts;

$\left|\frac{f_2}{f_1} - 1\right|$ – relative value of the increase in

the specific gravities of individual parts of the whole in the current period compared with the base;

n – number of structural parts.

The results of the values are:

- less than 0.02 – small structural changes;
- 0.02–0.1 – significant structural changes;
- more than 0.1 – large structural shifts.

Of all the indicators that assess structural changes the most accurate are Salai Index, Gatev integral coefficient and Ryabtsev coefficient of structural differences.

Salai Index:

$$J_c = \sqrt{\frac{\sum_{i=1}^N \frac{(f_2 - f_1)^2}{(f_2 + f_1)^2}}{n}}, \quad (4)$$

where f_1 and f_2 – specific values of structures;

– number of structural parts.

Gatev integral coefficient:

$$K_G = \sqrt{\frac{\sum (f_2 - f_1)^2}{\sum f_1^2 + \sum f_2^2}}, \quad (5)$$

where f_1 and f_2 – specific values of structures;

n – number of structural parts.

These two indicators can take values from 0 to 1, general quantitative criteria for assessing the presence of structural differences / shifts / can be applied here. The integral coefficient characterizes the significance of structural differences / shifts / in relation to the type of structures being compared. For example, if large elements prevail in the structure, then the value of the indices, *ceteris paribus*, will be less. The Salai Index characterizes the change in which elements in the structure occurred. Those. if the specific gravity of large elements has changed / differs, then the value of the Salai index, *ceteris paribus*, will be less in comparison with changes / differences / small in specific gravity of structures.

Ryabtsev coefficient of structural differences:

$$K_R = \sqrt{\frac{\sum_{i=1}^N (f_2 - f_1)^2}{\sum_{i=1}^N (f_2 + f_1)^2}}, \quad (6)$$

where f_1 and f_2 – specific values of structures;

This coefficient is more preferable, because it has its own scale of values and differs in that it does not overestimate the structural values.

Discussion

All of the above indicators are based on the principle of the measurability of structural changes through the assessment of the deviation of the specific gravity and the proportion of the corresponding structural element in a given time period to the previous one [15].

The economic development of Kazakhstan is characterized by a contradiction: on the one hand, economic growth is observed, on the other hand, negative changes are taking place, leading to the weakening of the most progressive elements of the economic structure [16].

To analyze the structure of the national economy of Kazakhstan, we chose the period

from 1993–2018. Due to the fact that the data for 1991 and 1992, in official sources are given in rubles, since tenge has not yet been entered on the territory of the Republic of Kazakhstan. All of the above coefficients were presented in the form of visual figures. The main 4 coefficients, namely: coefficient of absolute differences of structures, Ryabtsev coefficient, Gatev coefficient and Salai index are illustrated in figure 1.

As can be seen from the figure 8 that results are approximately the same, except for a slight difference in Salai index line. Figure 2, represents dynamics of coefficients of structural shifts and GDP change during the last 26 years.

As we can see from figure 2 the most significant shifts in Kazakhstan’s economy occurred during

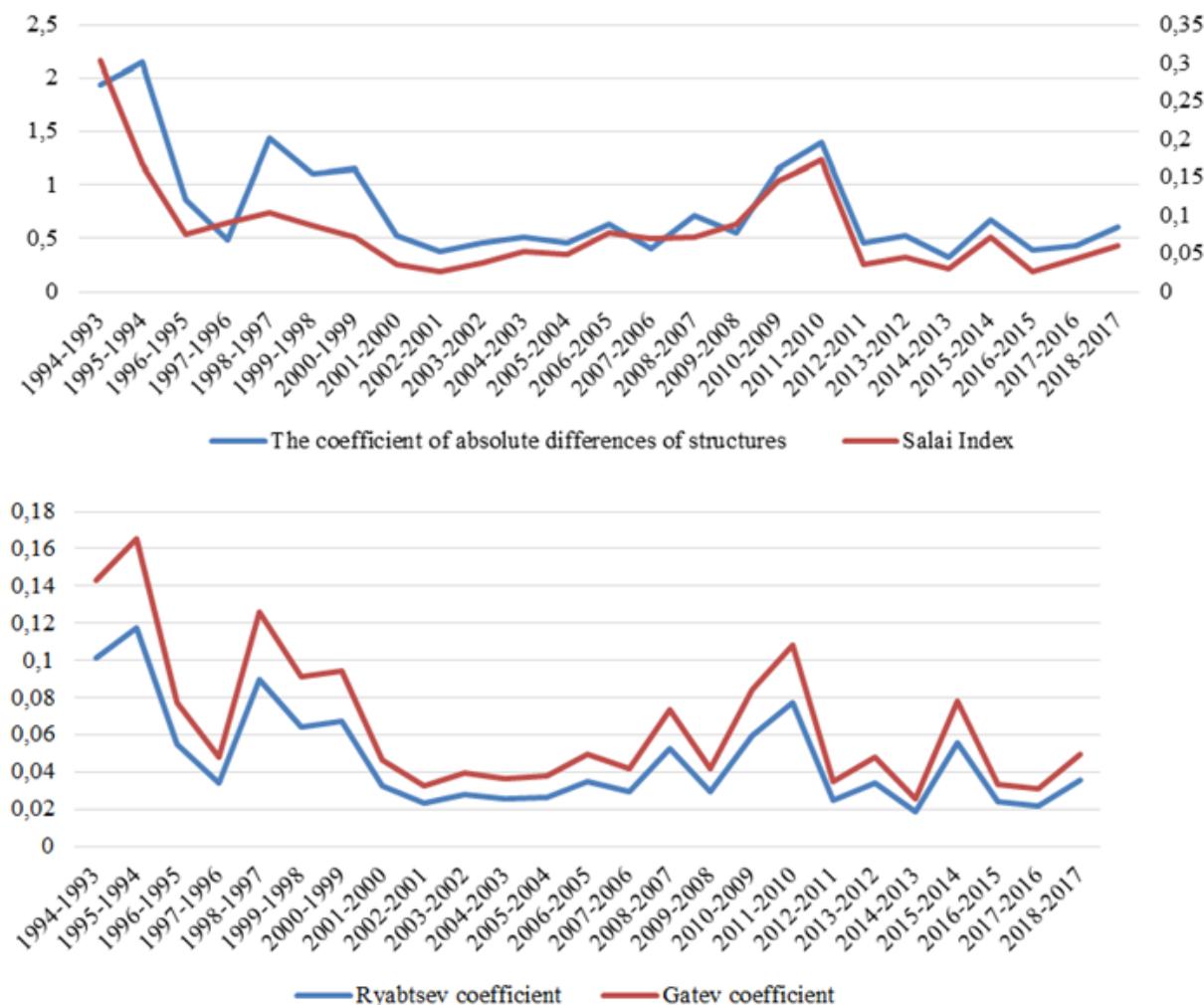


Figure 1 – Four main coefficients illustrating structural shifts

Note – compiled by author according to the source [16]

the first 8 years. More precisely in 1995, 1998 and 2000. Next we would like to take a look at changes occurred in GDP more specifically through the analysis of its main sectors and their constituents. Figure 3 represents GDP sectors shares throughout the analyzed period.

In the 1990-1995 years, it's clearly seen that

production of goods value in total GDP outpaced the share of the service sector. But since 1995 service sector started to drastically increase. Subsequently, production of goods shares decreased, hitting its lowest mark in 2015 – 35,6%. The reduction of production of good share was the most noticeable between 1996–1998, and

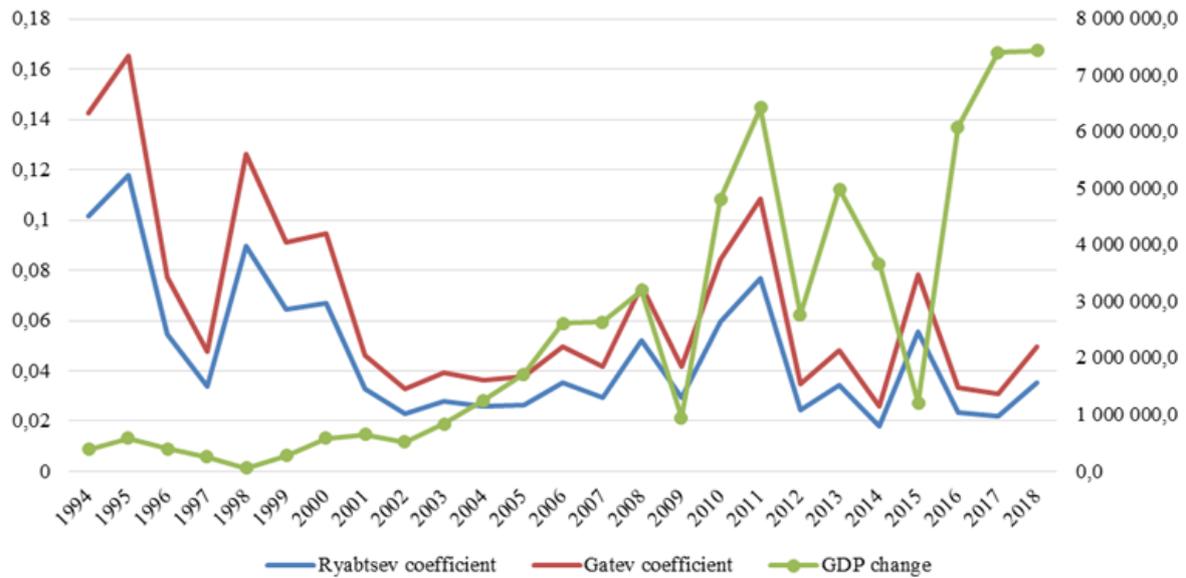


Figure 2 – Dynamics of structural shifts coefficients and GDP change
 Note – compiled by author according to the source [16]

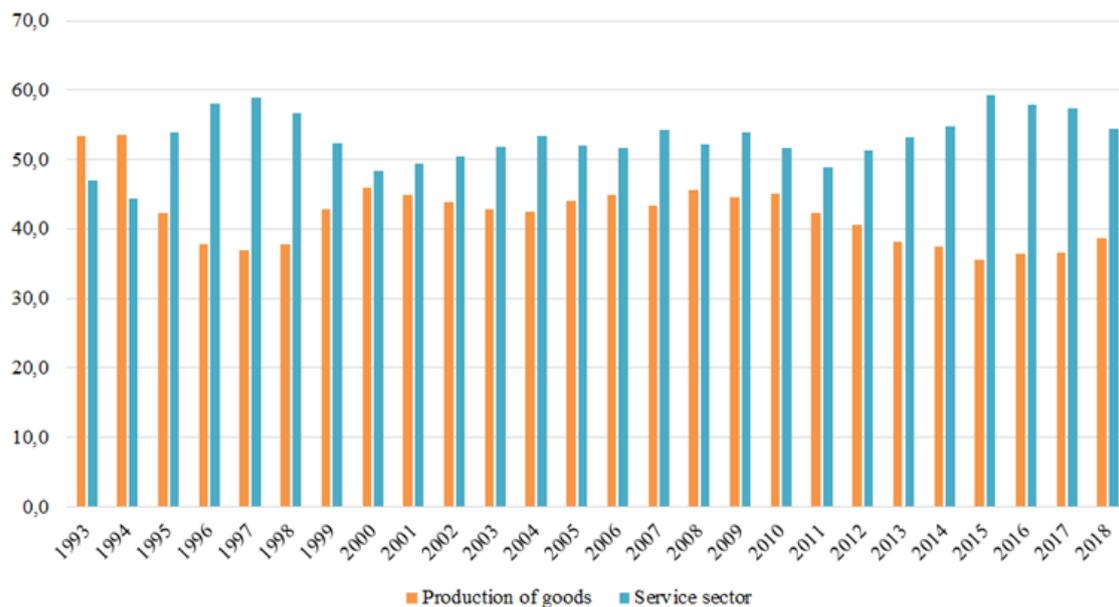


Figure 3 – Shares of GDP production sectors of the Republic of Kazakhstan
 Note – compiled by author according to the source [16]

2013–2018. That is when the share value couldn't even hit 40% of total volume. In 2000, production of goods share showed a little growth, both shares almost caught, till 2013 production of goods share fluctuated between 40–45%.

So despite the fact of Kazakhstan's economy making an accent on industry production, service sector surpasses production of goods. It might have a positive influence on country's economy. Today, the service sector occupies an increasingly stable position in the global economy. And also plays a key role in ensuring economic growth and employment. Service sector covers the most important socio-economic aspects of our lives. Service sector amount growth is very important because education, health and social services are in direct dependence on him.

In figure 4 the dynamics and structure of production of goods presented.

As can be seen from the figure 4, the share of industry in the total volume of production of goods is much higher than the share of agriculture and construction. Moreover, the line of industry is identical to the line of production of goods throughout the analyzed period. That is, it can be said that basically the production of goods of the Republic of Kazakhstan is represented by the industry. Which means that it is precisely as a result of changes in industry that the

entire volume of production of goods changes. However, from 1994 to 1997, industry declined significantly, at that time there was an increase in the share of agriculture. Further, since 1998, the share of industry in the total volume has shown rapid growth, reaching a peak in 2000 – 32.6%. The next peak is observed in 2010 – 32.9%. After which the share slowly declined, reaching 24.9% in 2015. However, in the past three years, the share of industry has shown an upward trend.

The share of agriculture in the structure of production of goods in the first 10 years exceeded the share of construction. However, the share of agriculture was gradually decreasing. If at the beginning of the analyzed period the share was 16.4%, then by the end it had decreased by 4 times, reaching 4.2%. Throughout all time, the share of agriculture tried to show some growth. We can see that in 1999, 2001 and 2009. But, unfortunately couldn't achieve the initial results.

Here, in the figure 5 structural shifts and employment change are presented.

It is clearly seen that, the amount of employed people changes during the most significant structural shifts in economy. Which means that consequences of changes occurred in national economy have a straight impact on employment. In the years of strong structural shifts people lose their jobs.

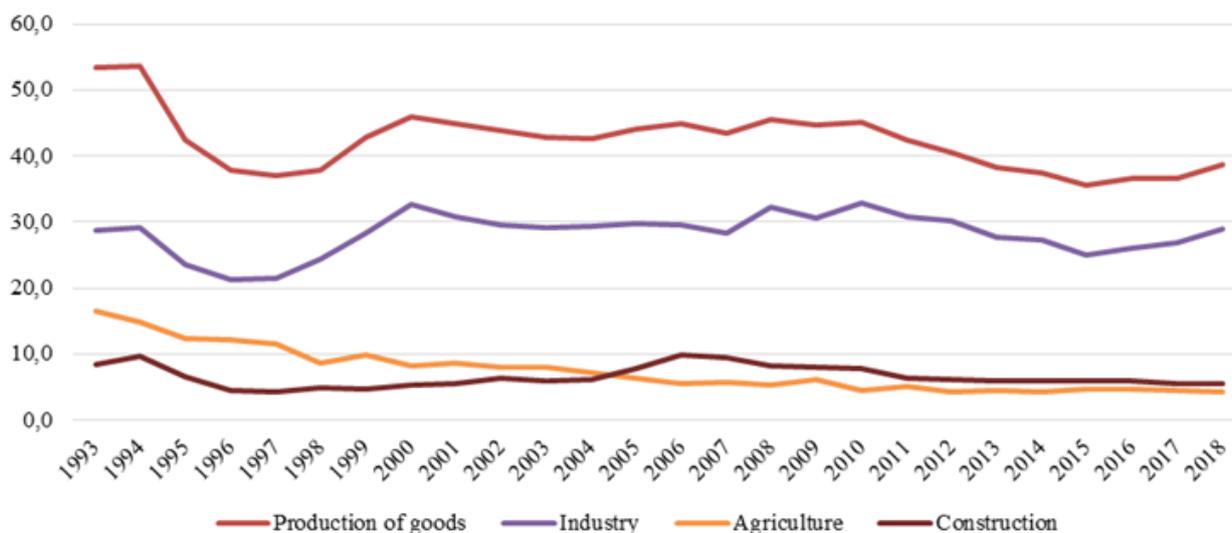


Figure 4 – Dynamics and structure of production of goods in the Republic of Kazakhstan, %
 Note – compiled by author according to the source [16]

In figure 6 the structure of employed population by the most popular sectors is presented. Most popular areas for work is industry and education. Seemingly these two sectors have similar tendency to change and are showing rise since 2000. In 2018, the difference

between this two sectors was only 2000 people and little bit less than in agriculture.

But here is one interesting thing – that type of employment structure does not yet correspond to the sectoral structure of employment in advanced economies.

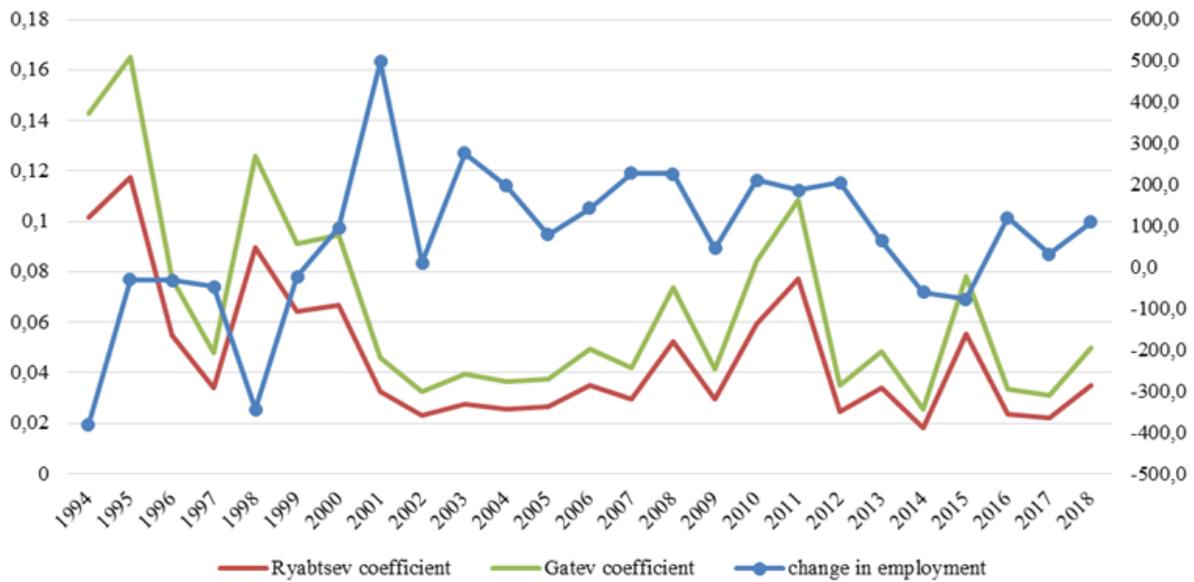


Figure 5 – Dynamics of coefficients of structural shifts and employment change

Note – compiled by author according to the source [16]

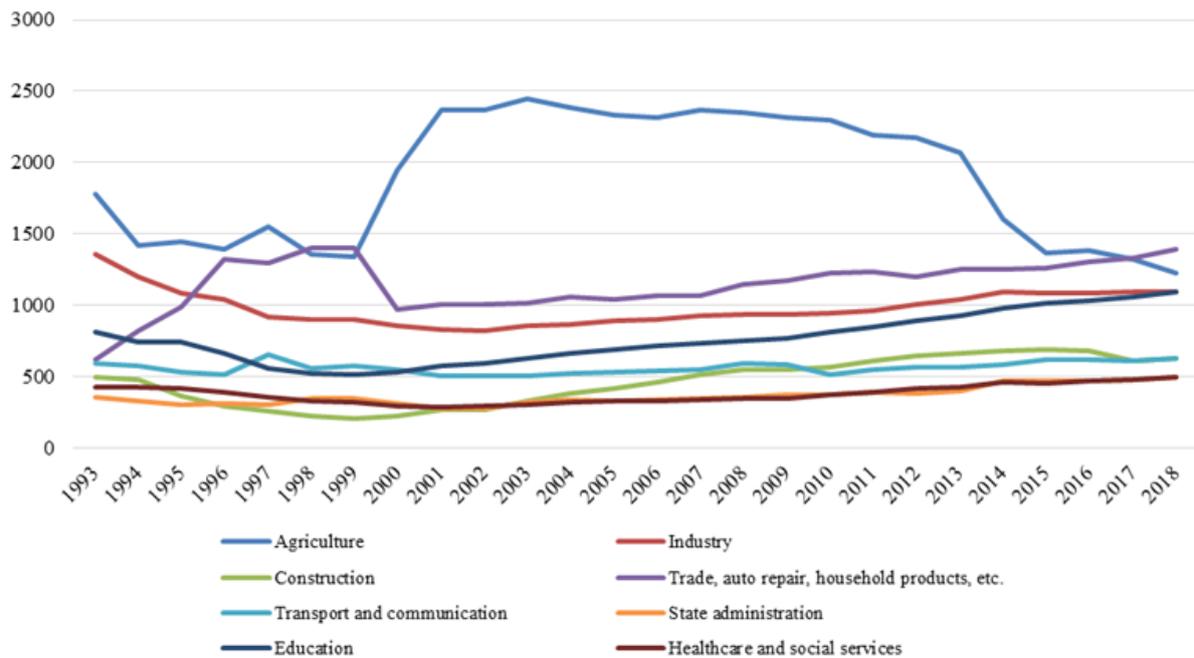


Figure 6 – Dynamics employed population by the most popular sectors, thousand people

Note – compiled by author according to the source [16]

Moreover, it is noted that agriculture sector has a large number of unproductively self-employed people in it. Also, we have to take into consideration the fact that the gross agricultural output is several times inferior to the volume of industrial production. If in the beginning of the analyzed period industry production was 4 times more than agriculture production, in the last year there was a difference by 6 times. Even mining and manufacturing sectors of industry make production more by 2–3 times, despite the fact that the amount of employed people in these two areas is 4 times less.

Results

The average annual growth rate of Kazakhstan's GDP in the period from 1998 to 2008 was 24%, in the period from 2008 to 2018 it decreased to 14%. Of course, it is impossible to say unequivocally that the country's economy is developing inefficiently. The reason for this decline may be related to the transition of the economy to a new sustainable level, which provides some development, but still holds back from higher performance. Another reason may lie in the obsolescence of the existing model of economic growth, which is based on the dominant development of the commodity sector of the economy of Kazakhstan, which led to a slowdown in GDP growth.

For all the years of independence, the economy of Kazakhstan has changed quite intensively. From the obvious, the share of agriculture has significantly decreased from 16.4% in 1993 to 4.2% in 2018; education 15% to 2.7%; health 10.6% to 1.8%. However, there was a slight increase in the share of scientific activity from 3.4% to 4.2%, due to the restructuring of GDP and the joining of professional and technical activities to science. The leading positions in the country's GDP are accounted for by industry 28.9%, wholesale retail trade, transport and warehousing, as well as real estate operations. Such an approach to the development of the country as a whole cannot be correct, because the development of human capital is at a very low level. Even if we take into account the development of the ICT industry

and the increase in its share in GDP in developed countries, respectively, the reduction in the share of other important industries, in Kazakhstan, the process of ICT development is significantly slower.

In the structure and dynamics of global demand, Kazakhstan shows very low indicators of the reverse participation rate (about 6%). The reason is, as has been said more than once, the raw material orientation of the country's economy.

Table 2 shows the classification of mining and manufacturing industries by their level of adaptability, and also shows their share in the volume of industrial production. As can be seen from the table, industries with a low technological level produced more than half of industrial products in 2018. These include the extraction of fuel and energy resources (49.4%), the production of food products, including beverages and tobacco (7.9%), and the extraction of minerals other than fuel and energy (5.9%). The category of low-level medium-technological production includes metallurgical production and production of finished metal products (19.3%) and coke production, oil refining (3.3%). As for high-tech activities, the share of production does not exceed 1%.

In general, this fact of disproportion confirms the raw materials orientation of the country's policy, and the difficulties in the development of other industries. To solve this problem, it is necessary to ensure the dissemination of available advanced technologies in the production of low-tech and medium-tech activities. Which, in our opinion, will help improve the situation.

Conclusion

Thus, it should be noted that the structural transformations affecting the economy of the Republic of Kazakhstan have become a very serious challenge for the economy and have led to a deterioration in its quality, a decrease in productivity.

The development of the industrial sector is undoubtedly important, but is it possible to achieve more effective development of the country and the region by investing mainly in tangible assets? New technologies and innovations can

significantly speed up the production process. However, they cannot work without adequate human resources, and are also subject to physical and moral wear and tear. The most successful way to develop the lagging industries in the

region is to invest in human capital. Because all the technologies and innovations were created it is people. Investing human capital is a costly and time-consuming process that does not give a quick result.

Table 2

Classification of mining and manufacturing industries by the level of manufacturability and their share in the total volume of production output 2018

The nature of industries by level manufacturability	Types of economic activity of mining and manufacturing industries	Mining and manufacturing industries production output	Share of economic activities
	Mining and manufacturing industries, total	25 108 706 437	100%
Low tech activities	Mining, except fuel and energy	1 474 218 362	5,9%
	Extraction of fuel and energy minerals	12 403 231 344	49,4%
	Textile and clothing	89 162 467	0,4%
	Food Production, including Beverages and Tobacco	1 995 101 313	7,9%
	Production of paper and paper pulp, printing	62 380 796	0,2%
	Production of leather and related products	10 188 472	0,0%
	Manufacture of other finished products	62 354 669	0,2%
	Others (repair and installation of machinery and equipment, technical services)	1 471 058 740	5,9%
Medium-tech low-level production	Manufacture of rubber and plastic products	211 379 506	0,8%
	Manufacture of other non-metallic mineral products	563 678 357	2,2%
	Metallurgical production and production of finished metal products	4 854 482 338	19,3%
	Coke production, oil refining	901 981 804	3,6%
High-tech mid-level manufacturing	Chemical production	401 141 428	1,6%
	Manufacture of electrical equipment, electronic and optical equipment	167 597 323	0,7%
	Manufacture of motor vehicles, trailers and semi-trailers	208 109 170	0,8%
High tech activities	Basic Pharmaceutical Product Manufacturing	78 526 094	0,3%
	Manufacture of machinery and equipment, not included in other categories	154 114 254	0,6%

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Қазақстан Республикасы экономикасындағы құрылымдық ілгерілеулер

Аннотация. Экономикадағы құрылымдық өзгерістер әлемдік экономикадағы объективті құбылыс болып табылады. Барлық елдер бұл процеспен бетпе-бет келеді, бірақ барлық елдерде құрылымдық өзгерістердің себептері, қарқындылығы және салдары әртүрлі. Мақала құрылымдық өзгерістерді, олардың табиғатын, қарқындылығын, сондай-ақ экономикаға әсерін анықтайтын теориялық тұжырымдамаларды зерттеуге арналған. Мақалада құрылымдық өзгерістер индекстерін, олардың икемділігін талдау негізінде Қазақстандағы құрылымдық өзгерістерге талдау жасалады. Қазақстан Республикасында Тәуелсіздік кезеңінде экономиканы индустриясыздандыру процесіне және оның тиімділігін төмендетуге алып келген құрылымдық ілгерілеулер байқалғаны анықталды. Жалпы ішкі өнімнің жалпы көлеміндегі өңдеуші өнеркәсіп үлесін төмендету, технологиялық оңайлатумен көрсетілетін қызметтер үлесін арттыру. Зерттеудің негізгі тұжырымы ҚР экономикасындағы құрылымдық өзгерістердің сапасы экономиканы артқа тастап, экономиканы аз өнімді және тиімсіз еткендігін көрсету болып табылады.

Түйін сөздер: экономика құрылымы, құрылымдық өзгерістер, құрылымдық өзгерістер индексі, ЖІӨ құрылымы, технологиялық құрылым, өндіріс.

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Структурные сдвиги в экономике Республики Казахстан

Аннотация. Структурные сдвиги в экономике являются объективным явлением в мировой экономике. С этим процессом сталкиваются все без исключения страны, однако во всех странах различны причины, интенсивность и последствия структурных сдвигов. Статья посвящена изучению структурных сдвигов, теоретических концепций, определяющих их природу, интенсивность, а также последствия для экономики. В статье проводится анализ структурных изменений в Казахстане на основе анализа индексов структурных сдвигов, их эластичности. Выявлено, что в период независимости в Республике Казахстан наблюдались структурные сдвиги, приведшие к процессу деиндустриализации экономики и снижению ее эффективности. Отмечены снижение доли обрабатывающей промышленности в общем объеме валового внутреннего продукта, повышение доли услуг при их технологичной упрощенности. Основной вывод исследования заключается в том, что качество структурных изменений в экономике РК отбросило экономику назад и сделало ее менее производительной и неэффективной.

Ключевые слова: структура экономики, структурные сдвиги, индекс структурных изменений, структура ВВП, технологическая структура, производство.

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