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ASSESSMENT OF THE MIGRATION POTENTIAL OF THE POPULATION OF RURAL AREAS OF KAZAKHSTAN

ҚАЗАҚСТАННЫҢ АУЫЛДЫҚ АЙМАҚТАРЫНЫҢ ТҰРҒЫНДАРЫНЫҢ КӨШІ-ҚОН ӘЛЕУЕТІН БАҒАЛАУ

ОЦЕНКА МИГРАЦИОННОГО ПОТЕНЦИАЛА НАСЕЛЕНИЯ СЕЛЬСКИХ ТЕРРИТОРИЙ КАЗАХСТАНА

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Abstract. An assessment of current state of one of the key indicators of agricultural economy of the Republic of Kazakhstan - the migration potential of the rural population has been presented. The issues of assessing and measuring the migration of the population of the republic - the number of departures and arrivals, as well as the balance of migration have been considered. It is noted that these methodological approaches to assessing the current situation in internal migration of the population are generally accepted. The data on internal migration of the rural population of the republic are presented. The points of view and scientific approaches of Kazakhstan researchers dealing with this problem are presented. Based on the study of statistical information on the current state and dynamics of internal migration of the rural population of Kazakhstan, statistical dependencies were calculated which characterize the dynamics of the balance of this migration for 2010–2017. The autocorrelation coefficients of the balance (r) and the average approximation error for all functional identities are determined. The best dependence was

chosen, on the basis of which the medium-term forecast of migration potential of population living in the rural areas of the country was done. The authors point out the need to take into account the results obtained in the development of national and regional policy documents, the purpose of which is to further effectively develop agricultural labor market, as well as to ensure the growth of the level and quality of life of the population living in rural areas.

Аңдатпа. Қазақстан Республикасы аграрлық экономикасының негізгі индикаторларының бірі – ауыл халқының көші-қон әлеуетінің ағымдағы жағдайына баға берілген. Республика халқының көші–қонын - кеткендер мен келгендер санын, сондай-ақ көші-қон сальдосын бағалау және өлшеу мәселелері қаралды. Халықтың ішкі көші-қонымен қалыптасқан қазіргі жағдайды бағалаудың осы әдістемелік тәсілдері жалпы қабылданған екені көрсетілген. Республиканың ауыл халқының ішкі көші-қоны туралы деректері ұсынылған. Осы проблемамен айналысатын қазақстандық ғалым-зерттеушілердің көзқарастары мен ғылыми көзқарастары келтірілген. Қазақстанның ауыл халқының ішкі көші-қонының ағымдағы жай-күйі мен серпіні туралы статистикалық ақпаратты зерделеу негізінде 2010-2017 жж. осы көші-қон сальдосының серпінін сипаттайтын статистикалық тәуелділіктер есептелген. Барлық функционалдық ұқсастықтар үшін қалдықтар (r) және аппроксимацияның орташа қателерінің автокорреляциясының коэффициенттері анықталған. Ең жақсы тәуелділік таңдап алынды, оның негізінде елдің ауылдық жерлерінде тұратын халықтың көші-қон әлеуетінің орта мерзімді болжамы орындалды. Авторлар аграрлық еңбек нарығын одан әрі тиімді дамыту, сондай-ақ ауылдық жерлерде тұратын халықтың өмір сүру деңгейі мен өмір сапасының өсуін қамтамасыз ету мақсаты болып табылатын ұлттық және өңірлік бағдарламалық құжаттарды әзірлеу кезінде алынған нәтижелерді есепке алу қажеттілігін көрсетеді.

Аннотация. Дана оценка текущего состояния одного из ключевых индикаторов аграрной экономики Республики Казахстан – миграционного потенциала сельского населения. Рассмотрены вопросы оценки и измерения миграции населения республики – численности выбывших и прибывших, а также сальдо миграции. Отмечено, что данные методические подходы к оценке современной ситуации, сложившейся с внутренней миграцией населения, общепринятые. Представлены данные о внутренней миграции сельского населения республики. Приведены точки зрения и научные подходы казахстанских ученых-исследователей, занимающихся данной проблемой. На основе изучения статистической информации о текущем состоянии и динамике внутренней миграции сельского населения Казахстана рассчитаны статистические зависимости, характеризующие динамику сальдо этой миграции за 2010-2017 гг. Определены коэффициенты автокорреляции остатков (r) и средней ошибки аппроксимации для всех функциональных тождеств. Выбрана наилучшая зависимость, на основе которой выполнен среднесрочный прогноз миграционного потенциала населения, проживающего в сельской местности страны. Авторы указывают на необходимость учета полученных результатов при разработке национальных и региональных программных документов, целью которых является дальнейшее эффективное развитие аграрного рынка труда, а также обеспечение роста уровня и качества жизни населения, проживающего в сельской местности.

Keywords: rural territories, population, migration, migration potential, agricultural labor market, level, quality of life, forecasting.

Түйінді сөздер: ауылдық аумақтар, халық, көші-қон, көші-қон әлеуеті, аграрлық еңбек нарығы, деңгейі, өмір сүру сапасы, болжау.

Ключевые слова: сельские территории, население, миграция, миграционный потенциал, аграрный рынок труда, уровень, качество жизни, прогнозирование.

Introduction. The ubiquitous urbanization process has not bypassed Kazakhstan. The growing importance of cities, the concentration of political, economic and cultural life in them influenced the demographic characteristics of the state. The logical consequence of these processes is the influx of people into the cities from the rural areas, which is characteristic of many regions in Kazakhstan.

The President of the Republic of Kazakhstan N.A. Nazarbayev in his annual address to the people of Kazakhstan "New opportunities under the fourth industrial revolution" (January 10, 2018) said that "The people of Kazakhstan should have the opportunity to

find new employment relatively quickly, including in other localities of the country" [1].

Agreeing with the opinion of the Leader of the Nation we believe that the assessment of the population migration scale, especially the internal one, will make it possible to more fully characterize the demographic processes taking place in Kazakhstan and develop correspondent state policy. For analysis and assessment of population displacements in Kazakhstan, it seems necessary to assess the migration potential of rural territories of the Republic of Kazakhstan.

Present time, there are disproportions in the interregional migration redistribution of the population in the Republic of Kazakhstan.

Therefore this problem may also entail negative consequences for local labor markets, which are experiencing the effects of natural and mechanical population decrease. The redistribution of human resources is a source of improving the balance of the regional labor market.

We suppose that in these conditions, it is necessary to assess the possibilities of the optimal redistribution of human and labor resources within the country, which is in line with the national interests of Kazakhstan.

Material and methods of research. In modern scientific literature, the term "potential" is widely used, which is considered by researchers in various fields of knowledge and areas. Among them are philosophy, demography, sociology, medicine, biology, economics and others. It acts as an integral indicator characterizing the capabilities of any aggregate that can be implemented now or in the nearer future.

Ibrishev E.N., Moldashev A.B. and others consider the characteristics of system processes associated with the solution of social problems in rural areas. The authors pay particular attention at the outflow of young specialists from the village, their level of adaptation in the countryside is low [2].

Akimbekova Ch.U., Meirman K.M. note the importance of moving the labor resources from labor-intensive to labor-deficient regions of our country [3].

Bodauhan K., Dzhusibalieva A.K., arguing about the influence of migration on employment in agriculture of the Republic of Kazakhstan, note that migration is an effective tool for creating conditions for the growth of economic and activity of business entities, the formation of a single internal economic space that is harmoniously integrated within the global economy [4].

Belgibayeva A.S. offers the implementation of measures that are aimed at the development of rural areas, increasing the efficiency of public administration, creating favorable conditions for the development of small and medium-sized businesses in the agricultural sector [5].

There are the following methods to the assessment of the migration potential.

Results and their discussion. The term "migration potential" is paid little attention in the modern domestic scientific literature, much more often it is met in the works of Russian researchers.

One of the first Russian scientists of the concept of the migration potential of the post-Soviet period is L.L. Rybakovskiy. We agree with his definition of the term "migration potential" which is characterized as "... this is an assessment of migration resources located in the countries that are possible donors for the country of the recipient. However, the possibility of becoming a donor does not always mean reality. The reality depends not only on the capabilities of the donor countries, but also on the necessary scale and preferred structure of migrants for the recipient country, as well as the acceptable conditions for their admission" [6].

The dynamics of the internal migration of population's indicators in Kazakhstan in 2015-2017 is presented in table 1.

Table 1 – Internal migration of population in Kazakhstan in 2015-2017

people

Region	Arrivals			Departures			Balance of the internal migration		
	2015	2016	2017	2015	2016	2017	2015	2016	2017
1	2	3	4	5	6	7	8	9	10
All population									
Republic of Kazakhstan	455451	616894	930820	455451	616894	930820	0	0	0
Akmola	19862	19620	37978	16203	33246	36088	3659	-13626	1890
Aqtobe	15462	21878	36753	17031	24416	37332	-1569	-2538	-579
Almaty	45259	69135	111178	56728	72849	117603	-11469	-3714	-6425
Atyrau	11701	15043	26523	11732	15243	26539	-31	-200	-16
West-Kazakhstan	15702	21246	38995	15531	23704	40229	171	-2458	-1234

1	2	3	4	5	6	7	8	9	10
Zhambyl	17376	17042	29680	25839	32673	46514	-8463	-15631	-16834
Karagandy	31649	31980	43683	32023	38912	49797	-374	-6932	-6114
Kostanai	27150	25506	37495	26056	29536	39669	1094	-4030	-2174
Kyzyl-Orda	15297	21636	30254	18531	28256	34881	-3234	-6620	-4627
Mangystau	11928	11943	43356	11243	14282	43597	685	-2339	-241
South-Kazakhstan	47180	55436	125329	61680	84966	139931	-14500	-29530	-14602
Pavlodar	19047	22221	28476	18705	25124	31496	342	-2903	-3020
North-Kazakhstan	19539	15897	22259	21086	20608	25071	-1547	-4711	-2812
East-Kazakhstan	35843	36435	62194	40059	47721	71844	-4216	-11286	-9650
Astana	30373	134967	135105	32836	58017	100668	-2463	76950	34437
Almaty city	92083	96909	121562	50168	67341	89561	41915	29568	32001
Urban population									
Republic of Kazakhstan	324636	444342	586487	258494	359861	538202	66142	84481	48285
Akmola	9554	9859	14184	7660	13865	15060	1894	-4006	-876
Aqtobe	11361	15496	24375	9962	13894	19430	1399	1602	4945
Almaty	15713	20118	24454	18944	24886	43924	-3231	-4768	-19470
Atyrau	7603	8298	10895	5063	6876	12507	2540	1422	-1612
West-Kazakhstan	8179	12609	23149	6743	9542	18273	1436	3067	4876
Zhambyl	10654	6671	8206	11172	14800	19751	-518	-8129	-11545
Karagandy	25410	26194	33353	21547	27192	34501	3863	-998	-1148
Kostanai	16293	14751	20476	9899	12524	15289	6394	2227	5187
Kyzyl-Orda	9127	11457	13874	7611	11425	15589	1516	32	-1715
Mangystau	3955	3045	9590	7267	8453	19988	-3312	-5408	-10398
South-Kazakhstan	35871	38937	83879	36259	46612	77627	-388	-7675	6252
Pavlodar	13292	14792	17058	9883	14722	17934	3409	70	-876
North-Kazakhstan	11154	6781	9313	5196	5741	6628	5958	1040	2685
East-Kazakhstan	24014	23458	37014	18284	23971	31472	5730	-513	5542
Astana	30373	134967	135105	32836	58017	100668	-2463	76950	34437
Almaty city	92083	96909	121562	50168	67341	89561	41915	29568	32001
Rural population									
Republic of Kazakhstan	130815	172552	344333	196957	257033	392618	-66142	-84481	-48285
Akmola	10308	9761	23794	8543	19381	21028	1765	-9620	2766
Aqtobe	4101	6382	12378	7069	10522	17902	-2968	-4140	-5524
Almaty	29546	49017	86724	37784	47963	73679	-8238	1054	13045
Atyrau	4098	6745	15628	6669	8367	14032	-2571	-1622	1596
West-Kazakhstan	7523	8637	15846	8788	14162	21956	-1265	-5525	-6110
Zhambyl	6722	10371	21474	14667	17873	26763	-7945	-7502	-5289
Karagandy	6239	5786	10330	10476	11720	15296	-4237	-5934	-4966
Kostanai	10857	10755	17019	16157	17012	24380	-5300	-6257	-7361
Kyzyl-Orda	6170	10179	16380	10920	16831	19292	-4750	-6652	-2912
Mangystau	7973	8898	33766	3976	5829	23609	3997	3069	10157
South-Kazakhstan	11309	16499	41450	25421	38354	62304	-14112	-21855	-20854
Pavlodar	5755	7429	11418	8822	10402	13562	-3067	-2973	-2144
North-Kazakhstan	8385	9116	12946	15890	14867	18443	-7505	-5751	-5497
East-Kazakhstan	11829	12977	25180	21775	23750	40372	-9946	-10773	-15192
Source: [7].									

In accordance with this table the amount of population left the rural area of residence in the Republic of Kazakhstan decreases year by year. Thus, in 2017 this value was 392 618 people which is 135 585 people (or 52,75%) more than in 2016 and 195 661 people (or 99,34%) more than in 2015.

The presented statistical methods and indicators are generally accepted and do not allow to answer a number of some questions related to the forecasting the migration processes. In this case we offer to calculate mathematic dependencies (mathematic functions) allowing characterizing perspective trends of migration processes. Here the following types of functions are applied: linear, second degree parabola, exponential, logarithmic parabola, logarithmic function, hyperbolic dependence and one harmonic Fourier row.

For analytical and forecasting estimates of the migration potential of the population living in the rural areas, the authors will

calculate statistical dependencies (mathematical functions), the basis for which is an eight-year period (2010-2017). For the calculation of the unknown parameters of the above mentioned functions, the least squares method was used, applied to solve various problems, based on minimizing the sum of squares of deviations of some functions from the desired variables [8].

Further, the statistical characteristic of each functional dependence will be carried out based on the calculations of the autocorrelation coefficient of the residuals (r), which allow determining the statistical equation that best describes the dynamics of the studied indicator and, accordingly, is most suitable for the performance of the medium-term forecast.

The residual autocorrelation coefficient (r) is calculated as follows:

$$r = \frac{\sum l_x \cdot l_{x-1}}{\sum (l_x)^2} \qquad (1),$$

where $l_x = y_x - \hat{y}_x$, x – the number of the corresponding year in the calculations; y_x – the actual value of the considered indicator in the year x; $\hat{y}_x$ –calculated meaning of the considered indicator, obtained from the corresponding functional dependence in the year x.

Table 2 shows the analytical functions and their statistical characteristics describing the dynamics of the migration balance of rural population to urban areas in 2010-2017.

Table 2 – Analytical functions and its statistical characteristics describing the dynamics of the migration potential of the population living in rural areas in 2010-2017

N	Analytical function		Statistical characteristic
	General form	Actual form	
1	$y = a + b \cdot x$	$y = 35\,051{,}0 + 4\,084{,}58 \cdot x$	-0,174
2	$y = a + b \cdot x + c \cdot x^2$	$y = 29\,815{,}2 + 7\,226{,}1 \cdot x - 349{,}1 \cdot x^2$	-0,136
3	$y = a \cdot b^x$	$y = 37\,050{,}26 \cdot 1{,}076^x$	-0,126
4	$y = a \cdot b^x \cdot c^{x2}$	$y = 33\,981{,}82 \cdot 1{,}333^x \cdot 0{,}994^{x2}$	-0,101
5	$y = a + b \cdot \ln(x)$	$y = 37\,698{,}35 + 0{,}236 \cdot \ln(x)$	0,699
6	$y = a + b/x$	$y = 62{,}028 - 25\,305{,}18/x$	0,138
7	$y = a + b \cdot \cos(x) + c \cdot \sin(x)$	$y = 53\,431{,}63 + 6\,639{,}79 \cdot \cos(x) - 17\,263{,}49 \cdot \sin(x)$	-0,589
Note: compiled by the authors [lk. 8]			

According to the obtained results, the best function for analysis and medium-term forecasting the migration potential of the population living in rural areas is the equation (4), since the r meaning is the smallest in absolute value.

Using the obtained analytical functions, we will carry out a medium-term forecast of the dynamics of the migration potential of the population living in rural areas at 2018-2020.

To perform medium-term forecasts, we determine the confidential intervals for the selected function. The basis of the confidential interval calculation of the forecast is the indicator of variability of the dynamic row's levels relative to the functional trend's dependency (S_y). It is considered that the larger the meaning of this indicator is, the wider is the forecast interval with the same degree of probability. The variability of the levels of the dynamic row relative to the trend is determined by the following formula:

$$S_y = \sqrt{\frac{\sum (y_x - \hat{y}_x)^2}{n - m - 1}} \qquad (2),$$

where y_x, – actual levels of the dynamic row; $\hat{y}_x$ – the calculated values of the levels of the dynamic row for the trend equation; n – dynamic row's length; m – the number of parameters in the trend equation (without the free parameter) .

The confidential interval for the trend is determined based on the following mathematical expression:

$$\hat{y}_t \pm t_a \cdot S_y \qquad (3),$$

where t_a – table meaning of the Student criteria. In further calculations, the authors selected the value of Student's criterion, equal to 2.57, which corresponds to the eight-year period (2010-2017), taking into account the probability of 95%.

Table 3 presents the calculated values of the confidential intervals levels' variability for the selected dependence (4) from the table 2, as well as the forecasting values for them under assessing the migration potential of the population living in rural areas of the Republic of Kazakhstan in 2018-2020.

Table 3 – Values of the of the confidential intervals levels' variability and forecasting values of the migration population potential living in the rural areas of the Republic of Kazakhstan in 2018-2020

people

Actual meaning / Forecasting meaning	Year / S_y / $\hat{y}_t$	Logarithmic parabola, (4)
Actual meaning	2016	84 481
	2017	48 285
-	S_y	14 766,77
Forecasting meaning	2018	65 703
	2019	66 737
	2020	67 011
Note: compiled by the authors [lk. 8]		

Conclusion.

Summarizing and generalizing the above-mentioned we conclude the following:

♦ the amount of population departed from the rural area of residence in the Republic of Kazakhstan increases year by year;

♦ the forecasting values of the studied indicator for the logarithmic parabola in 2018-2020 are increasing;

♦ the performed forecasts and the results for them are subjective, since the factors that influence the dynamics of the migration potential of the population living in rural areas in the Republic of Kazakhstan were not taken into account;

♦ the authors believe that the obtained forecasting results can be taken into account in the development of national and regional policy documents, the purpose of which is to further effectively develop the agricultural labor market, as well as to ensure the growth of the level and quality of life of the population living in the rural areas.

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