

Received: 13-05-2023

Accepted: 24-07-2023

Factor Model for The Migration Processes Development in Kazakhstan

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Abstract

Migration, being a reflection of socio-economic processes, processes in society, highlights issues related to the identification of the phenomena that cause it.

The purpose of the article is to build a multifactorial model for the development of infectious processes.

In the course of the study, the main factors affecting the interaction of processes in Kazakhstan in 1991-2021 were identified, a theoretical and methodological justification was given for the dependence (independence) of the regulation of processes on wages, formal and informal employment, assessment of the standard of living of the population, cultural and educational level development of the Kazakhstan population in their morbidity-temporal aspect.

Correlation coefficients were calculated and the degree of analysis of indicators was estimated based on calculations of pairwise regression between variables using the SPSS 23 program.

Keywords: *migration, multifactorial model, wages, investments, unemployment, informal employment.*

1. INTRODUCTION

Migration has a significant impact on the formation of the demographic structure of the population of countries and their regions, the state of regional and local labor markets. A rapid change in the working-age population of a particular territory due to migration processes leads to an imbalance in supply and demand in the labor markets and a change in the demographic structure of the population.

Migration processes are inextricably linked with such fundamental categories as "Space" and "Time". This is especially evident when analyzing the migration processes of the population. The analysis and study of these processes take place mainly in a certain period (in dynamics) and geographical (in spatial) context.

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Revealing the features of migration processes in Kazakhstan in its space-time context, it should be noted that after gaining independence for thirty years, from 1991 to 2021 they had their originality and trends.

For data comparability purposes, we divided this period into two periods: 1991-2004 and 2005-2021. This approach is not based on the arithmetic division of thirty years into two periods of almost equal duration but has objective socio-economic, political, and cultural grounds.

Revealing the second stage of development of migration processes in Kazakhstan from 2006 to 2021, we note that it is characterized by some stability, the manifestation in their development of certain patterns and trends, and the structural features.

To substantiate the identification of these patterns, trends and structural features below we present a scientific and theoretical justification for the development of migration processes and an analysis of the factors that influenced them in the Republic of Kazakhstan during this period.

2. BACKGROUND

The fundamental provisions of the analysis and development of the migration processes of the population are their disclosure from the standpoint of the natural sciences, in particular in the Spatio-Temporal context.

In this regard, we note that the formation of the modern world order was directly related to movement, migration. This is characteristic of both the natural, physical world, and the world of people, animals, and, apparently, other yet undiscovered worlds.

According to the theoretical calculations of Krugman and Obstfeld (2009) the force of gravity of foreign trade relations between countries is directly proportional to their economic potential and inversely proportional to the distance between them. It should be noted that similar laws of gravity also exist in the migration processes of the population. Zip (1946); Cohen et al., (2008) note that the strength of gravity in human migration depends on the ratio of the number of people living in areas P1 and P2 and the distance D separating these areas.

The modern scientific study of the migration processes of the population should be associated with another concept - "Time". By the way, the concept of "Time" as a measure of distance in its spatial meaning is used when people answer that the distance between two places is two days on foot, one day on horseback, or thirty minutes of flight by plane.

Features of human relationships show that the spatial, temporal and economic factors of the migration analysis of the population are not enough. According to the Lewis and Fields (2014) model, such sectors of the economy as industry, services, urban construction, can develop their potential based on rural industries with low labor productivity and compensation. Since the supply of labor in the agricultural sector is higher and wages are lower, this sector has an extensive type of development. At the same time, industry and services in cities have a high demand for labor. People migrate from villages with traditional agricultural industries to cities with industrial or service sectors.

Harris and Todaro (1970) worked on models of rural-urban migration. Their goal is to build a two-sector model of internal migration and unemployment. When deciding to migrate, a person compares expected wages, while the natural estimate of the probability of not receiving wages is the unemployment rate. The underlying Harris-Todaro model has made a fundamental contribution to migration theory: migration is primarily a response to expected differences between rural and urban incomes.

The definition of population migration as a territorial movement of individuals within the boundaries of one economic region or beyond its borders, abstracted from the causal relationship between movements, makes it possible to consider migration as a random process. This makes it possible to apply probabilistic approaches to migration modeling. Many modern migration models use a method based on the use of Markov processes (Meyn & Tweedie, 1993; Zhong, 1964; Rogers, 1966; Brown, 1970; Joseph, 1975). When using this method, it is assumed that the probabilities of the transition of each inhabitant from region to region over a certain time are known. The above theoretical approaches made it possible to describe the migration process in the new capital of Kazakhstan (Tatibekov, 2005).

Researchers note the importance of the socio-economic factor. Different living standards in countries and/or regions within a country affect migration flows (Chulanova, 2022). Moreover, when analyzing the gravitational force of this factor, migration mainly occurs and is directed in one direction - from a country or region with a lower standard of living to a country or region with a higher standard of living.

An important factor in migration is the situation in the labor market. The opportunity to find a job, higher earnings, employment characteristics, working conditions, the specifics of the profession, as well as the specifics of the education received, leave their mark on migration flows. (Chulanova, 2019).

Analyzing migration and its gravitational forces, researchers note its cultural aspect. Language, customs, and traditions are an important, if not the main, characteristic of ethnic migration. If the political, economic, and social factors are important for all types of migration, then cultural ones are not only distinctive but the most important and main factor in the analysis of ethnic migration (Tatibekov & Hanks, 2017).

3. BUILDING A FACTOR MODEL FOR THE MIGRATION PROCESSES DEVELOPMENT

Revealing the conceptual foundations of the economic factor influencing the development of migration processes, we note that the economic factor can acquire various indicators or determinants.

Wage. The low level of income or wages in the countryside is an important reason for the migration of the population to cities. In addition, differences in wages between countries when analyzing external migration and regions (regions, districts) within a country when analyzing internal migration are important economic indicators that reflect the migration processes development. According to the main methodological provisions, when reflecting wages, concepts and definitions based on the standards and recommendations of the International Labor Organization (ILO, 2023) are used.

Calculations have shown that there is a close correlation between nominal wages and the arrival of migrants (Table 1). The null hypothesis that there is no relationship between nominal wages and the number of migrants arriving is rejected or there is a relationship between them.

Table 1: Correlation between nominal wages and the number of migrants arriving

		Arrival of migrants	Average monthly nominal salary
Arrival of migrants	Pearson Correlation	1	0.834**
	Significance (two-sided)		0.000
	N	16	16
Average monthly nominal salary	Pearson Correlation	0.834**	1
	Significance (two-sided)	0.000	
	N	16	16

Notes:						
1) Testing the null hypothesis about the absence of a relationship between variables						
2) The average monthly nominal salary is an independent variable						
3) Arrival of migrants is a dependent variable						
4) **Correlation is significant at 0.01 (two-way).						
5) The correlation coefficient is positive (0.834)						
Entered/deleted variables ^a						
Model	Entered variables		Deleted variables		Method	
1	Average monthly nominal salary		.		Enter	
a. Dependent variable: Arrival of migrants						
b. All required variables are entered.						
Model Summary						
Model	R	R-square	Adjusted R-square	Standard estimation error		
1	0.834 ^a	0.695	0.674	146561.215		
a. Predictors: (constant), Average monthly nominal salary						
ANOVA ^a						
Model		Sum of squares	Degree of freedom - (df)	Middle Square	F	Significance
1	Regression	686121848524.417	1	686121848524.417	31.942	0.000 ^b
	Remains	300722656267.021	14	21480189733.359		
	Total	986844504791.438	15			
a. Dependent variable: Arrival of migrants						
b. Predictors: (constant), Average monthly nominal salary						
Coefficients ^a						
Model		Non-standardized coefficients		Standardized coefficients	t	Significance
		B	Standard error	Beta		
1	(Constant)	98852.404	87675.454		1.127	0.278
	Average monthly nominal salary	4.379	0.775	0.834	5.652	0.000
a. Dependent variable: Arrival of migrants						

At the same time, calculations of the correlation between the nominal wage index and the real wage index by regions of Kazakhstan with the number of incoming and outgoing migrants did not confirm a close relationship (Table 2).

Table 2: Correlation of the nominal wage index and the real wage index by regions of Kazakhstan with the number of migrants arriving and departing

		Arrival of migrants	Nominal Salary Index	Real Salary Index	Departure of migrants
Arrival of migrants	Pearson Correlation	1	-0.367	-0.235	0.999**
	Significance (two-sided)		0.163	0.381	0.000
	N	16	16	16	16
Nominal Salary Index	Pearson Correlation	-0.367	1	0.861**	-0.388
	Significance (two-sided)	0.163		0.000	0.137
	N	16	16	16	16
Real Salary Index	Pearson Correlation	-0.235	0.861**	1	-0.260
	Significance (two-sided)	.381	0.000		0.331
	N	16	16	16	16
Departure of migrants	Pearson Correlation	0.999**	-0.388	-0.260	1
	Significance (two-sided)	0.000	0.137	0.331	
	N	16	16	16	16
Notes:					
1)** Correlation is significant at 0.01 (two-way).					
2) The correlation coefficients between the number of migrants and the nominal and real wage indices are not sufficiently significant and may not be taken into account in the calculations.					

As can be seen from Table 2, the correlation coefficient between the number of arrived migrants and indexes of nominal and real wages is not significant enough. In the case of the index of nominal wages and the number of arrivals, it is -0.367, and the number of departed migrants is -0.388. In the case of revealing the relationship between the real wage index and the number of migrants arriving, it is equal to -0.235, and the number of those leaving, is equal to -0.260. In all four cases, the coefficients are not significant, and therefore may not be taken into account in the calculations.

Investments in fixed capital. Investments in fixed assets are one of the important sources of creating new jobs which are an important reason for attracting migrants from other regions of the country.

To determine how much investment in fixed capital has affected the number of migrant arrivals, the final calculations of the pairwise regression between these variables using the SPSS 23 program are presented below. As calculations show, in the period 2005-2020, in general, in Kazakhstan there was a close relationship between the arrival of migrants and investments in fixed assets (Table 3).

Table 3: Correlations between investments in fixed assets and the arrival of migrants

		Arrival of migrants	Investment			
Arrival of migrants	Pearson Correlation	1	0.875**			
	Significance (two-sided)		0.000			
	N	16	16			
Investment	Pearson Correlation	0.875**	1			
	Significance (two-sided)	0.000				
	N	16	17			
Notes:						
1) Testing the null hypothesis about the absence of a relationship between variables						
2) Investments in fixed assets – an independent variable						
3) Arrival of migrants is a dependent variable						
4) **Correlation is significant at 0.01 (two-way).						
5) The correlation coefficient is positive (0.875), there is a connection						
Model Summary						
Model	R	R-square	Adjusted R-square	Standard estimation error		
1	0.875 ^a	0.765	0.749	128580.051		
a. Predictors: (constant), Investment						
ANOVA ^a						
Model		Sum of squares	Degree of freedom - (df)	Middle Square	F	Significance
1	Regression	755384890690.210	1	755384890690.210	45.690	.000 ^b
	Remains	231459614101.228	14	16532829578.659		
	Total	986844504791.438	15			
a. Dependent variable: Arrival of migrants						
b. Predictors: (constant), Investment						
Coefficients ^a						
Model		Non-standardized coefficients		Standardized coefficients	t	Significance
		B	Standard error	Beta		
1	(Constant)	152929.898	66836.590		2.288	0.038
	Investments	6.301E-5	0.000	.875	6.759	0.000
a. Dependent variable: Arrival of migrants						

Unemployment. Employment or unemployment rates are the most important determinants of migration within a country. The unemployment rate is an important economic and social indicator that reflects social tensions. With a high probability, it allows making

assumptions and forecasts about future migration flows. Correlation coefficient for the period 2005-2020 between the unemployment rate and the balance of migration was quite significant (0.853) (Table 4).

Table 4: Correlations between the unemployment rate and the migration balance

		Migration balance	Unemployment			
Migration balance	Pearson Correlation	1	0.853**			
	Significance (two-sided)		0.000			
	N	16	16			
Unemployment	Pearson Correlation	0.853**	1			
	Significance (two-sided)	0.000				
	N	16	16			
Notes:						
1) Testing the null hypothesis about the absence of a relationship between variables						
2) Unemployment is an independent variable						
3) Migration balance – dependent variable						
4) **Correlation is significant at 0.01 (two-way).						
5) The correlation coefficient is positive (0.853), there is a connection.						
Model Summary						
Adjusted R-square		Standard estimation error				
0.708		10238.961				
a. Predictors: (constant), Unemployment						
ANOVA ^a						
Model		Sum of squares	Degree of freedom - (df)	Middle Square	F	Significance
1	Regression	3914203270.443	1	3914203270.443	37.336	0.000 ^b
	Remains	1467708435.307	14	104836316.808		
	Total	5381911705.750	15			
a. Dependent variable: Migration balance						
b. Predictors: (constant), Unemployment						

Coefficients ^a				
Non-standardized coefficients		Standardized coefficients	t	Significance
B	Standard error	Beta		
-87028.784	13922.792		-6.251	0.000
14433.296	2362.108	0.853	6.110	0.000
a. Dependent variable: Migration balance				

Calculations of the correlation between the number of migrants who arrived and unemployment showed an insignificant but inverse relationship (-0.572) which is quite legitimate (Table 5). Calculations of a straight-line pair regression were performed where the dependent is the number of migrants who arrived, and the independent is the unemployment rate.

Table 5: Correlations between the unemployment rate and the arrival of migrants

		Unemployment	Arrival of migrants
Unemployment	Pearson Correlation	1	-0.572*
	Significance (two-sided)		0.020
	N	16	16
Arrival of migrants	Pearson Correlation	-0.572*	1
	Significance (two-sided)	0.020	
	N	16	16

Notes:						
1) * Correlation is significant at 0.05 (two-way)						
2) Arrival of migrants is a dependent variable						
3) Unemployment is an independent variable						
4) The correlation coefficient is minus 0.572.						
Model Summary						
Model	R	R-square	Adjusted R-square	Standard estimation error		
1	0.572 ^a	0.328	0.280	217700.019		
a. Predictors: (constant), Unemployment						
ANOVA ^a						
Model		Sum of squares	Degree of freedom - (df)	Middle Square	F	Significance
1	Regression	323338331065.038	1	323338331065.038	6.822	0.020 ^b
	Remains	663506173726.399	14	47393298123.314		
	Total	986844504791.438	15			
a. Dependent variable: Arrival of migrants						
b. Predictors: (constant), Unemployment						
Coefficients ^a						
Model		Non-standardized coefficients		Standardized coefficients	t	Significance
		B	Standard error	Beta		
1	(Constant)	1309057.842	296025.365		4.422	0.001
	Unemployment	-131181.451	50222.959	-0.572	-2.612	0.020
a. Dependent variable: Arrival of migrants						

The standard of living has a diverse impact and is determined by various indicators that reflect the material and non-material aspects of life. The standard of living is most clearly represented by such an indicator as the income of the population is below the subsistence level. The correlation coefficient between these two variables is (-0.370), and the negative relationship between the variables corresponds to their logical relationship, since regions with a high proportion of the population with incomes below the subsistence level are less attractive to migrants. To confirm the hypothesis, calculations of straight-line pair regression or their dependence are presented (Table 6).

Table 6: Correlation between the number of migrants arriving and the proportion of the population with incomes below the subsistence minimum

		Arrival of migrants	The share of the population with incomes below the subsistence minimum			
Arrival of migrants	Pearson Correlation		1			
	Significance (two-sided)		0.159			
	N		16			
The share of the population with incomes below the subsistence minimum	Pearson Correlation		-0.370			
	Significance (two-sided)		0.159			
	N		16			
Model Summary						
Model	R	R-square	Adjusted R-square	Standard estimation error		
1	.370 ^a	0.137	0.075	246679.151		
a. Predictors: (constant), The proportion of the population with incomes below the subsistence minimum						
ANOVA ^a						
Model		Sum of squares	Degree of freedom - (df)	Middle Square	F	Significance
1	Regression	1349360546290.084	1	134936054629.084	2.217	0.159 ^b
	Remains	8519084501620.354	14	60850603583.025		
	Total	986844504791.438	15			

a. Dependent variable: Arrival of migrants						
b. Predictors: (constant), The proportion of the population with incomes below the subsistence minimum						
Coefficients ^a						
Model		Non-standardized coefficients		Standardized coefficients	t	Significance
		B	Standard error	Beta		
1	(Constant)	645661.242	89523.421		7.212	0.000
	The proportion of the population with incomes below the subsistence minimum	-12251.782	8227.496	-0.370	-1.489	0.159

a. Dependent variable: Arrival of migrants

Informal employment. The analysis of migration processes in the context of informal employment is based on the fact that migrants in some (if not many) cases find work in the informal sector of the economy. The possibility of avoiding official registration with the migration services, the payment of taxes by employers and migrants are important reasons for informal employment among migrants. According to the calculations, the closeness of the relationship between the number of migrants who arrived in various regions of Kazakhstan and the number of informally employed in these regions for the period 2005-2021 was quite high (Table 7). Despite the rather high closeness of the relationship, it is required to note their negative relationship. According to economic logic, this negative relationship shows that with an increase in the number of migrants arriving in the study period, there was a decrease in the number of informally employed. This, to some extent, contradicts our statement above that the increase in informal employment in many cases is associated with migration. To a certain extent, this is confirmed by the fact that on arrival migrants must be registered with the migration police where they must indicate their future place of work or area of employment.

Table 7: Correlations between the number of migrants arriving and informal employment

		Arrival of migrants	Informal employment
Arrival of migrants	Pearson Correlation	1	-0.841**
	Significance (two-sided)		0.000
	N	16	16
Informal employment	Pearson Correlation	-0.841**	1
	Significance (two-sided)	0.000	
	N	16	17

Notes:

- 1)**. The correlation is significant at 0.01 (two-way).
- 2) Arrival of migrants is a dependent variable
- 3) Informal employment is an independent variable
- 4) The correlation coefficient is minus 0.841
- 5) The null hypothesis about the absence of a connection between variables

Model Summary

Model	R	R-square	Adjusted R-square	Standard estimation error
1	0.841 ^a	0.707	0.686	143690.759

a. Predictors: (constant), Informal employment

ANOVA^a

Model		Sum of squares	Degree of freedom - (df)	Middle Square	F	Significance
1	Regression	697786026684.149	1	697786026684.149	33.796	0.000 ^b
	Remains	289058478107.289	14	20647034150.521		
	Total	986844504791.438	15			

a. Dependent variable: Arrival of migrants

b. Predictors: (constant), Informal employment

Coefficients ^a						
Model		Non-standardized coefficients		Standardized coefficients	t	Significance
		B	Standard error	Beta		
1	(Constant)	1188823.519	115769.578		10.269	0.000
	Informal employment	-0.281	0.048	-0.841	-5.813	0.000

a. Dependent variable: Arrival of migrants

Cultural and ethnic factor. Among the factors of migration, the cultural and ethnic factor is of no small importance. If the number of migrants by nationality can be used as an ethnic determinant of population migration, then in identifying the determinant characterizing the cultural factor, in our opinion, the number of spectators attending concerts and other cultural events in the regions of the country can be used. Of course, this indicator, not so closely reflects the connection with the arrival of migrants as an investment in the regions of the country, and this is shown by the correlation coefficient of the number of spectators who attended concerts and other cultural events in the regions of Kazakhstan with the number of migrants who arrived (Table 8). The calculations showed a positive correlation, although a low correlation (0.536) which can be explained by the peculiarities of the structure of the incoming migration flow in terms of the level of education, its professional and sectoral orientation.

Table 8: Correlations of the number of spectators who attended concerts and other cultural events with the number of migrants who arrived

		Arrival of migrants	Number of viewers
Arrival of migrants	Pearson Correlation	1	0.536*
	Significance (two-sided)		0.032
	N	16	16
Number of viewers	Pearson Correlation	0.536*	1
	Significance (two-sided)	0.032	
	N	16	17

* Correlation is significant at 0.05 (two-way)

In general, based on all of the above and the calculations made, Figure presents a multifactorial Model for the development of immigration processes in the Republic of Kazakhstan.

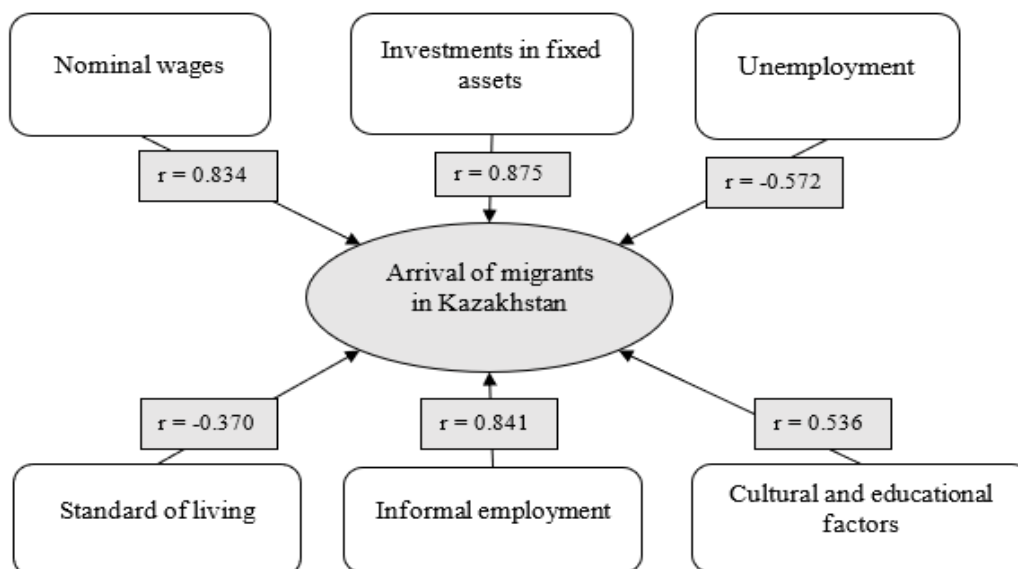


Figure: Model of the main factors determining the arrival of migrants in the Republic of Kazakhstan.

4. CONCLUSION

Revealing the conceptual foundations of economic phenomena that affect the development of transmission processes, we note that the economic factor can acquire various indicators or determinants.

The low level of income or wages in the countryside is an important reason for the migration of the population to cities. In addition, differences in wages between countries when analyzing external migration and regions (within a country when analyzing internal migration) are important economic indicators that reflect the migration processes development.

Population employment or the unemployment level, being important complementary socio-economic indicators of the region's development, are becoming the most important for determining migration processes within the country. Moreover, the unemployment rate, in our opinion, can be applied to the migration causes studying. That is, migration can be dependent, and unemployment - is an independent variable.

One of the important features of the study and analysis of migration processes is their analysis in the context of informal employment. This provision is based on the fact that newly arrived migrants in some (if not many) cases find work in the economy's informal sector.

Investments in fixed capital are an important factor in creating new jobs, which stimulates the attraction of migrants from other regions of the country.

Among the factors that determine and influence the migration of the population, the cultural and ethnic factor is of great importance. The correlation coefficient between the number of spectators who attended concerts and other cultural events and the number of migrants who arrived allows us to draw certain conclusions.

The study of a complex of factors made it possible to build a model of migration processes for Kazakhstan.

5. ACKNOWLEDGEMENT:

Authors of the paper express their deep appreciation to the Science Committee of the Ministry of Education and Science of the Republic of Kazakhstan which initiated development project No. BR10965247 "Study of factors, features and dynamics of demographic processes, migration, urbanization in Kazakhstan, development of digital maps and forecasts".

Declarations: Author declares that all works are original and this manuscript has not been published in any other journal.

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