# Socio-Economic Determinants of Migration Processes and the Mechanism of Their Regulation

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Abstract. The modern paradigm of socio-economic system development is determined by fluctuation changes and the transformation of integration in the migration processes regulation. In conditions of fluctuating transformations and social challenges, the analysis and migration processes regulation should be considered as a key issue of global social activity, and as the establishment of a strategic foundation for their development. The search for an effective analyzing method of the migration processes determinants and mechanisms for their regulation, which would combine global and regional mechanisms for regulating migration processes, is relevant. The aim of the study is to assess the socio-economic determinants of migration processes and to form a mechanism for their regulation. The object of research is the heterarchical structure of socio-economic relations that have developed in the process of regulating migration processes in their relationship and interaction and to form a structure for regulating migration processes. An integrated methodological approach was used for assessment and verifying the influence of various indicators of possible impact on migration, i.e., for evaluation by a system of indicators, which provided a high level of validity. The bootstrap method was used to build a model of migration processes determinants. This method is a means of constructing an empirical distribution and definition of the main determinants of migration processes regulation.

**Keywords:** Migration Processes; Socio-Economic Determinants; Bootstrap Method; Heterarchical Structure of Regulation; Institutional Agreements.

JEL Classification: F2, O15, R23

### 1. INTRODUCTION

In the era of globalization, migration processes strongly influence socio-economic systems, making adjustments and changing their development vector. Therefore, it is important to create an effective method for regulating these processes, which would combine global and regional mechanisms for regulating migration processes.

The modern paradigm of socio-economic systems is determined by fluctuation changes and the integration of transformations in the migration processes regulation. Migration processes are associated with the integration of national economic systems and globalization of the world market, and therefore are a natural result of the development of integration processes. The problems of migration processes are to some extent the result of inconsistent migration policies that do not take into account the determinants that affect these processes. Failure to take into account the complexity of the problem and the determinants of each of the spheres of the economy forces us to reconsider the positions of both state policy and science (Simon, 1999; Stark, 2001).

The complex nature of migration processes necessitates the application of a systematic approach to its study and search

for regulatory tools. Thus, regulatory mechanisms must respond to the challenges of globalization and the specifics of national economic systems, while maintaining interdependence and regional authenticity. From the point of view of economic relations, the purpose of migration regulation is to reduce the risks posed by population displacement and its consequences for economic and social effects. The complex nature of the phenomenon of migration processes and the multifactoriality of its nature necessitate the application of a flexible systematic approach to its analysis and regulation (Cristea and Grabara, 2019).

The formation of effective tools of migration policy is preceded by the study of trends and factors influencing migration flows, identifying determinants that can take into account current fluctuations and institutional changes. According to the results of comprehensive analysis by the Bootstrap method, the main determinants that define migration flows in such countries, as Poland, Ukraine, Romania, and EU countries have been identified. A model has been developed that reflects the dependence of the emigrants' number in different countries on the following determinants: quantitative GDP (as an indicator of the efficiency of the national economy), output (indicator of economic efficiency), and qualitative – competitiveness index (environmental indicator), index of human resource development (indicator of conditions of social development) (Simionescu, 2016).

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The model determines that the regulatory instruments of migration flows should be based on the concept of effective interaction between public authorities and the activities of economic entities, international organizations as effective institutions of influence at the international and regional levels. The tool that meets such requirements for the regulation of migration processes is a heterarchical concept of management, the essence of which is to form a relationship of interdependence, which allows you to shape the strategy of migration policy as an organic system. Thus, the state policy of migration processes regulation should be based on the postulates of a systematic approach, in which national migration policy is an element of the global mechanism for migration flows regulation, formed in cooperation with various governmental and intergovernmental organizations, social institutions and more (García-Ferrer, 1980).

In modern new conditions of fluctuating transformations, the search for an effective method of analysis of determinants of migration processes and mechanisms of their regulation, which would combine global and regional mechanisms of regulation of migration processes, become especially important.

The purpose of the study is to assess the socio-economic determinants of migration processes and form a mechanism for their regulation, which would combine global and regional mechanisms for regulating migration processes.

#### 2. LITERATURE REVIEW

The peculiarities of migration processes and their impact on the development of economic systems in different geographical locations were studied by P. Holicza and A. M. Stone (2016); Gustavo De Luna., E. Korneeva, W. Strielkowski (2016); I. Cseh Papp, S. Bilan and K. Dajnoki (2018); Danaj, K. Lazányi and S. Bilan (2018); M. Simionescu (2016); M. Bolečeková and B. Olejárová (2018).

Problems and trends in the development of migration processes in Ukraine, in particular, were studied by M. Lendel (2016); L. Semiv and Y. Hvozdovych (2012). Socioeconomic consequences and results of applied measures to regulate mobility and migration have been studied by scientists such as Izabela Jędrzejowska-Schiffauer and Peter Schiffauer (2017). Factor analysis and modeling of migration processes in scientific circles is becoming especially relevant today for the mechanism understanding. These issues were addressed by: L.A. Cristea and J. Grabara (2019); A. Tarasev and J. B. Jabbar (2018); A. García-Ferrer (1980).

Regarding the practice of regulating migration processes in the world, international organizations whose competencies are aimed at regulating migration processes play an extremely important role. Their main activity is to produce institutions that balance the causes and consequences of migration processes. The main organization in the field of migration policy is the United Nations. The UN is a universal institution for regulating socio-economic relations in the world. The main task in the field of migration processes is institutional support of regulation of migration processes (formation of normative legal acts, funds, programs) at the international level. An important role in regulating labor migration is played by the International Labor Organization, whose conventions are aimed at determining the status of migrant workers. The beginning of the ILO is associated with the beginning of the II – "Modern" – the period of development of universal international legal regulation of migration and labor processes. The specialized international organization that regulates migration processes is the International Organization for Migration (IOM), the main purpose of which is the formation of legal institutions for the migration processes regulation. Having studied scientific views and regulatory institutions, we believe that it is important to develop a methodology that defines the determinants of migration processes and the formation of tools that will determine the mechanisms of influence on them based on the assessment of determinants.

## **3. MATERIALS AND METHODS**

To define the determinants of migration processes and on the basis of their analysis for the formation of effective regulatory mechanisms of migration, research is made on the following areas:

1. Systematization of methodological approaches to the analysis of migration processes at the national and interstate levels.

2. Improving the methodology for defining the determinants of migration processes, which would determine the tools for their regulation.

3. Identification of determinants and assessment of their impact on migration processes.

4. Defining the mechanism of regulation of migration processes and distribution of tools for migration processes regulation between entities of different levels.

5. Formation of migration processes regulation mechanisms at the national and interstate levels.

The problem of migration is complex and dynamic, so its components are studied by different scientists and government officials, in different directions, levels and goals.

The basic principles of the study of migration and their regulation were defined in the XIX century. At the same time, the English scientist E. Ravenstein (1885) formulated eleven migration laws, which he developed, considering migration in Britain and North America. These laws are considered as classic, which indicates their objective nature, and therefore they are the core of the regulation of migration processes in the world. That is why many theories in migration studies are based on them. The main ones are as follows: most migrations take place over short distances; the larger the territorial center, the more attractive it is to migrants; each migration flow has its own counterflow; the growth of large cities is more due to population migration than natural increase; the scale of migration increases with the development of industry and trade, as well as especially with the development of transport; economic reasons for migration are decisive (Simon, 1999). These laws indicate that migration processes are caused and determined by the main factors - the migration process determinants.

#### 4. RESULTS

The selection of regulatory tools depends on the analysis and correct assessment of the determining factors that regulate migration processes. Thus, in the system of regulation of migration processes the main place belongs to the analysis and evaluation of the determinants of migration processes, as in our study. The formation of methods for monitoring, forecasting and recognizing the determinants of migration processes will identify effective tools for their regulation and balancing, as well as increase the effectiveness of state migration policy.

The main problems of existing methodological approaches are:

- indicators that determine the impact on migration processes do not reflect the complex nature of socio-economic development of the country;
- the determinants of migration processes and quantitative assessment of their impact are not defined. Techniques are often limited to empirical descriptions of impacts;
- the methodology does not contain a practical value for the formation of programs to regulate migration processes;
- the peculiarities of regional development and institutional support of migration policy in the country are not taken into account;
- variability of factors and fluctuation shifts on determinants of migration processes are not taken into account.

With many of methodological approaches to the study of the determinants of migration processes, most of them do not contain sound estimates of the factors of influence and the practical significance of the formation of migration policy.

We offer a method of assessing of the determinants of migration processes, which is based on economic indicators of socio-economic development of the country. An integrated approach involves assessing and verifying the relationship between different indicators of possible impact on migration, i.e., an assessment based on a system of indicators that provides a high level of validity.

The determinants of migration processes in different regions should be studied on indicators that reflect both quantitative and qualitative socio-economic determinants that may affect migration. These indicators should be easy to compare in different countries around the world and reflect the significant impact. We believe that the analysis of the determinants of migration processes will make it possible to determine the most effective levers of influence on these processes. Systematization of such levers can become the basis of state programs to regulate migration processes.

To build such model of determinants of migration processes, the bootstrap method was used. It was proposed by B. Efron (1979) of Stanford University (USA).

Bootstrap is one of the methods of "sample reproduction". The essence of the method is to form a large number (5-10 thousand) of pseudo-samples from the one available sample, each size of which coincides with the original, consisting of random combinations of the original set of elements (as a result in one pseudo-sample some source elements may occur several times, while others are absent), and for each obtained pseudo-sample to determine the analyzed statistical characteristic values in order to study their scatter, stability, distribution. It is proved that the use of such samples is the best estimation of the real distribution.

We believe that this method makes it possible to fully assess the factors influencing migration processes in different countries and identify significant (main) determinants that motivate people to leave.

Analysis of migration processes according to the proposed method will allow:

- to determine indicators of migration processes development in different countries and regions;
- to form a mechanism of migration processes regulation;
- to develop ways to improve migration policy in different countries around the world, based on effective existing tools.

Institutional features of different regions and differentiation of their socio-economic situation require the study of determinants of migration processes, which most fully take into account the characteristics of regional development and features of migration policy. This approach is especially important for the formation of levers of migration processes regulation, as migration processes in different regions are caused by different determinants – factors, fluctuations, mental characteristics of society and other institutions.

The method of complex analysis of the determinants of migration processes will determine the level of development of institutions taking into account the synergistic effect of their interaction in order to identify ways to improve international and regional migration policies taking into account the causal nature of phenomena.

The analysis of many indicators of national economies development identified the main ones that have a significant impact on migration flows.

- GDP gross domestic product, which characterizes the development of the economy and reflects the economic determinant of migration processes in our study.
- The volume of output is also an economic determinant and reflects the degree of industrial development as a factor in migration.
- Human Development Index (before 2013 "Human Potential Development Index")– integral index, developed by experts of the United Nations Development Program (UNDP) in 1990, characterizing the human development in different countries. The index is calculated annually and is used in the analytical reports of the United Nations on the prospects for human development. Since 2010, UN experts have also calculated the Human Development Index adjusted for socio-economic inequality.

	Poland's GDP at actual prices per capita, USD USA	The volume of Polish pro- duction, billion dollars	Poland's Human Development Index	Poland's Global Com- petitiveness Index	Emigration from Po- land, thousand people
2007	16782.44	70.02	0.81	4.28	35.5
2008	18303.35	85.90	0.82	4.28	30.1
2009	19254.09	71.81	0.82	4.33	18.6
2010	21088.62	73.60	0.835	4.51	17.4
2011	22827.7	82.95	0.83	4.46	19.9
2012	23745.7	80.11	0.84	4.46	21.2
2013	24567.51	81.47	0.85	4.46	32.1
2014	25475.5	89.71	0.847	4.48	28.1
2015	26862.05	83.51	0.85	4.5	28.1
2016	28322.11	84.99	0.855	4.49	12
2017	30064.5	88.55	0.86	67.92	11.9
2018	31978.53	93.26	0.877	68.16	11.8
2019	34151.8	99.15	0.88	68.89	10.7
2020	16782.44	111.44	0.88		8.8
2021	17318.5	120.2	0.872	55.195	

Source: Compiled by authors based on (The World Bank, 2020; Poland Manufacturing Output, 2022; Poland Competitiveness Index, 2020; Emigration from Poland from 2000 to 2020, 2021; Manufacturing Production in Poland, 2021; Latest Human Development Index Ranking, 2021)

Mod	e	Summary
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Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,883ª	,780	,682	87870,530
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Fig. (1). Indicators of model adequacy.

 The Global Competitiveness Index is a comprehensive indicator that includes the role of human capital, education, science and knowledge factor in the development of innovation in enterprises, regions and countries.

The number of emigrants is the resultant indicator in our study – the one defined by the determinants.

Therefore, we will formulate models of migration processes for some countries of the world (Poland, Ukraine, Romania and European countries). The choice of countries is determined by the empirical analysis of Ukraine's neighbors, whose experience can be implemented for the formation of regulatory mechanisms in Ukraine.

Based on the results of the model, we determined the multiple coefficients of determination. Thus, 73.3% of the variation in the number of emigrants is determined by the variation of these factors, and 26.7% – by the influence of unaccounted for factors.

The coefficients of the model are also significant. Based on this, the model can be used for further analysis.

The dependence of the number of emigrants from Poland on the main indicators of economic development may be represented as follows:

$$M_p = 6113884,604 - 2,843GNP_p + 20,313Y_p - 7146615,406I_h + 3055,413I_K - (1)$$

where  $M_P$  – the number of emigrants from Poland, people,  $GNP_P$  – Poland's GDP at actual prices per capita, US dollar,  $Y_P$  – volume of Polish products produced at market prices, million US dollar,  $I_{h_P}$  – Polish Human Development Index,  $I_{K_P}$  – Poland's global competitiveness index. The model is based on the following statistics (Table 1).

Multiple coefficients of determination are  $R^2 = 0,833$ . Thus, 88.3 % of the variation in the number of emigrants is determined by the variation of these factors, and 11.7 %– by the influence of unaccounted for factors.

The coefficients of the model are also significant (Fig. 1). Based on this, the model can be used for further analysis.

Thus, with an increase in GDP by 1 dollar, the number of migrants from Poland will decrease by 2 thousand people; with an increase in the Human Development Index by 1

	Ukraine's GDP at actual prices per capita, USD USA	Volume of production of Ukraine, billion dollars	Human Development Index of Ukraine	Global Competitive- ness Index of Ukraine	the number of emigrants from Ukraine
2007	3065.61	25.16	0.732	4.03	29669
2008	3887.24	27.7	0.736	3.97	22402
2009	2542.99	16.13	0.728	4.08	19470
2010	2965.14	17.98	0.733	3.95	14677
2011	3569.76	19.41	0.737	3.9	9578
2012	3855.42	21.76	0.74	4	14517
2013	4029.71	20.65	0.734	4.13	22187
2014	3104.64	16.32	0.747	4.05	12056
2015	2124.66	10.84	0.745	4.13	21409
2016	2187.73	11.41	0.743	4.03	6465
2017	2640.68	13.53	0.743	53.92	43029
2018	3096.82	15.13	0.75	57.03	24252
2019	3662.56	16.65	0.779	56.99	26789
2020	3726.93	15.77	0.779		19121
2021	4384.24	15.6	0.75	50.049	

Table 2. Statistical	Characteristics	of the St	udied Ind	icators for	Ukraine.
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Source: Calculated by authors based on (The World Bank, 2021; Ukraine: Gross domestic product, 2021; Latest Human Development Index Ranking, 2021; Human Development Index (HDI) by Country, 2022).

#### Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,802 <sup>a</sup>	,643	,464	7041,003

Fig. (2). Indicators of model adequacy.

point, the number of migrants from Poland will decrease by 71466 people.

According to the statistical data of Ukraine (Table 2), this dependence will look like:

$$M_U = 176233,695 - 2,95GNP_U + 1222,855Y_U - 219449,3I_{h_U} + 437,415I_{K U}$$
(2)

where  $M_U$  – the number of emigrants from Ukraine,  $GNP_U$  – Ukraine's GDP at actual prices per capita, US dollars,  $Y_U$  – volume of Ukrainian products manufactured at market prices, million US dollars,  $I_{h_P}$  – Human Development Index of Ukraine,  $I_{K_U}$  – Global Competitiveness Index of Ukraine. The following statistics were used to analyze emigration from Ukraine (Table 2).

The model is adequate and can be used for analysis (Fig. 2).

Thus, with the growth of GDP by 1 dollar, the number of migrants from Ukraine will decrease by 7 people; with the growth of the human development index by 1 point, the number of migrants from Ukraine will decrease by 2144 people.

The following statistics were used to analyze emigration from Romania (Table 3).

Based on the study, the optimal type of model for the Romanian economy is:

$$\begin{split} M_{R} = & -4327828, 324 - 7, 116GNP_{R} - 2859, 545Y_{R} + 9811695, 725I_{h_{-}R} - 5834381, 195I_{h_{-}R}^{3} + 705, 281I_{k_{-}R} - 1,403I_{k_{-}R}^{2}, \end{split}$$

where  $M_R$  – number of emigrants from Romania, person,  $GNP_R$  – Romania's GDP at actual prices per capita, US dollars,  $Y_R$  – volume of Romanian products at market prices, million US dollars,  $I_{h_R}$  – Romania's Human Development Index,  $I_{k_R}$  – Romania's Global Competitiveness Index. The model is adequate (Fig. 3).

Conclusions from this model: with the growth of GDP by 1 dollar, the number of migrants from Romania will decrease by 7 people, the growth of output by 1 billion dollars. The number of migrants from Romania will decrease by 2.860.

 $M = 2709877 + 7.96GNP - 0.2Y - 1138932I_{h_R} - 385139I_{k_R}, \quad (4)$ 

where M – the number of emigrants, people, GNP – GDP at actual prices per capita, US dollars, Y – volume of Romanian

Table 3. Statistical Characteristics of the Studied Indicators for Romania.	
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	Romania's GDP at actual prices per capita, USD USA	The volume of Romanian products, billion dollars	Romania's Human Development Index	Romania's Global Competitiveness Index	Emigration from Romania, pers
2007	8360.166	36.71	0.683	3.98	374156
2008	10435.04	47.03	0.7	3.97	389254
2009	8548.119	36.57	0.69	4.1	330672
2010	8214.077	38.21	0.752	4.1	458995
2011	9099.218	45.61	0.786	4.16	324626
2012	8507.105	34.10	0.78	4.07	372197
2013	9547.852	38.99	0.784	4.06	350556
2014	10043.68	42.08	0.8	4.12	371677
2015	8969.149	34.81	0.801	4.3	361083
2016	9548.587	37.93	0.802	4.32	389373
2017	10807.01	42.2	0.805	62.18	367826
2018	12398.98	45.16	0.823	63.46	238926
2019	12889.81	42.69	0.828	64.36	229500
2020	12896.09	38.40	0.828		
2021	14863.89	43.62	0.816	54.651	

Source: Calculated by authors based on (GDP per capita, 2021; Romania Manufacturing Output, 2022; Romania Competitiveness Index, 2019; Number of people who emigrated from Romania, 2020; Latest Human Development, 2021; Romania: Gross domestic product, 2020; Romania Manufacturing Production, 2020; The 2021 IMD World Competitiveness Ranking, 2021).

Model Summary							
Model R R Square Square Std. Error of							
1	,545ª	,297	-,758	47287,701			

Fig. (3). Indicators of model adequacy.

products manufactured at market prices, million US dollars,  $I_h$  – Human Development Index of Romania,  $I_K$  – Romania's Global Competitiveness Index. The analysis showed that the model is adequate and its indicators are significant.

Thus, with an increase in output by 10 million US dollars, the number of migrants from Europe will decrease by 2 persons; an increase in the Human Development Index by 1 point will decrease the number of migrants from Europe by 1139 people and an increase in the competitiveness index by 1 point will decrease the number of migrants by 385 thousand people.

#### 5. DISCUSSION

According to the results of a comprehensive analysis by the Bootstrap method, the main determinants that define migration flows are identified. That is, the model reflects the dependence of the number of emigrants in different countries on the following determinants: quantitative – GDP (as an indicator of efficiency of the national economy), output (efficiency of economic entities) and qualitative – competitive-

ness index (environmental indicator), Human Development Index (indicator of social development conditions).

It follows that the regulatory instruments of migration flows should be based on the concept of effective interaction between public authorities and the activities of economic entities and international organizations as effective institutions of influence at the international and regional levels.

Therefore, the problem is to find an effective mechanism for improving of migration regulation in terms of "public authorities-- international organizations" at the global and regional levels. The formation of an efficient system for coordinating the interests of migration processes is defined as a top priority of migration policy. Thus, the state must create an institutional mechanism that will in the best way promote the selforganization of elements of migration policy as a system of interconnected components.

The system of strategic regulation of migration flows should be improved in terms of the programs implementation forming. The basis for this surely is the formation of effective tools that would provide actual mechanisms for achieving



Fig. (4). Heterarchical structure of migration regulation.

goals and would be based on the support of all actors in socio-economic relations. This requires:

- to carry out a comprehensive assessment of the determinants of migration processes, to pay special attention to the definition of quantitative impact assessment (according to our method);
- to provide a regionally extensive system of implementation of migration policy programs, specifying the terms, results and responsible entities for the implementation of specific areas;
- to develop criteria for assessing the level of implementation of tasks specified in development programs.

The forming of a balanced system of migration regulation based on the proposed methodology can be intensified by concluding institutional agreements at the level of the hierarchical structure of socio-economic relations, which would specify the criteria of state regulation, mutual responsibility of organizations that regulate migration flows and the interdependence of state and economic mechanisms.

In our opinion, in order to realize the optimal balance of power between institutions and states, we should turn to the category proposed by D. Stark (2001)– "heterarchy". Heterarchy represents a new model of organization that is neither a market nor a hierarchy. If the hierarchy includes a relationship of dependence, and the market implies independence. The most valuable thing in the concept of "heterarchy" is that it is based on the principle of unity of forms of regulation of the economy and forms of management. Thus, international institutions and the state are perceived not as two separate systems, but as two parts of a single mechanism for regulating migration processes, which allows us to consider the migration policy of the national economy directly as a social phenomenon included in the organic social system.

With the implementation of the heterarchical concept of migration regulation, international organizations and institutions are becoming increasingly important in the institutional mechanism. Growing trends in their quantitative and qualitative development in the world are the result of institutional traps, which are the result of inconsistencies. Such associations began to develop in the process of self-organization of the socio-economic system. We believe that the development of such organizations lays the foundation for the practical implementation of the idea of heterarchical regulation of migration processes.

Thus, the hierarchy of migration regulation determines the system of vertical and horizontal relationships in the structure of migration policy regulation (Fig. 4).

Note that horizontal links are formed between public authorities and international organizations, and vertical are formed at the "state– region" level.

The forming of a balanced system of migration regulation can be intensified through the conclusion of institutional agreements at the level of the proposed hierarchical structure, which would indicate the criteria of state intervention, mutual responsibility of international organizations and institutions and the interdependence of state and international mechanisms.

Thus, it is the heterarchical structure of migration regulation that can most fully define the influence of the determinants of migration processes, through quantitative indicators that have been previously determined. The study identifies the main socio-economic determinants of migration processes and the structure of their regulation.

#### 6. CONCLUSIONS

The complex nature of the phenomenon of migration processes and the multifactorially of its nature necessitate the application of a flexible systematic approach to its analysis and regulation. In terms of economic relations, the purpose of regulating migration is to reduce the risks posed by population displacement and its consequences for economic and social effects. The development of effective migration policy tools requires the use of sound tools for analyzing statistics on migration flows, such as those that can take into account current fluctuations and institutional changes. Based on the results of a comprehensive analysis by the Bootstrap method, the main determinants that define migration flows are identified. That is, the model reflects the dependence of the number of emigrants in different countries on the following determinants: quantitative – GDP (as an indicator of efficiency of the national economy), output (efficiency of economic entities) and qualitative – competitiveness index (environmental indicator), Human Development Index (indicator of conditions of social development). It follows that the regulatory instruments of migration flows should be based on the concept of effective interaction between public authorities and the activities of economic entities, international organizations as effective institutions of influence at the international and regional levels.

Improving migration regulation as a basic element of migration policy requires the introduction into the structure of the institution of migration regulation of the heterarchical concept, the essence of which is the interdependence forming, which allows making a migration policy strategy as an organic system. The policy of regulating migration processes of the state should be based on the postulates of a systematic approach, in which the national migration policy is an element of the global mechanism for regulating migration flows, formed in cooperation with various governmental and intergovernmental organizations, social institutions and more.

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