

# DEMOGRAPHIC SAFETY IN THE CONDITIONS OF THE FOURTH REVOLUTION

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**Abstract:** *The provisions of the Fourth Industrial Revolution, which may affect the demographic security of the country, are considered. For Ukraine, which is a source of low-cost labor, the problem of demographic security is considered through aspects of demographic and educational criteria. The idea that the parameters of changes in the demographic security of the country are caused by the dynamics of the crude birth rate, death rate, natural increase, migration, and education level is substantiated. Based on the methodology proposed by the Ministry of Economic Development and Trade of Ukraine, demographic security studies have been conducted for the country as a whole. It has been established that the socioeconomic and demographic development of certain regions of Ukraine is not homogeneous, so it requires radical decisions at the local and national levels.*

**Key words:** *demographic security, socioeconomic development, Ukraine, Fourth Industrial Revolution.*

**JEL Classification:** *J110, I250, O140, O150*

## 1. INTRODUCTION

The Fourth Industrial Revolution, the inevitability of which in recent years has been actively discussed globally, will lead to the significant changes in economic and social processes. Ukraine will not be kept aloof from such changes, although the period of implementation of innovations of this revolution may last for decades. Significant changes are the most likely to have an instant impact in the demographic sphere, influencing the security of the country. Demographic security is a state of protection of the nation, society and the labor market from demographic threats, which ensures the development of Ukraine taking into account the set of balanced demographic interests of the state, society and the individual in accordance with the constitutional rights of citizens of Ukraine [1]. Considering the transformations that affect the demographic security of the country, one may note the following – changes in the structure of labor, lowering of menial and semi-skilled work value, middle class income loss, and wealth gap widening between Ukraine and the developed countries.

Considering this issue in advance, it is worth pointing out the need for the structural changes in the social policy of the country, as the advantages that Ukraine has now (geography and business environment, resource base, internal and external relations) will lose their importance in the age of Industry 4.0. Education and health care will rank foremost, because they can sufficiently contribute to the formation and preservation of highly skilled labor potential, thereby ensuring the development of the country up to par.

### *1.1 Subsection*

Today, national and foreign scientists have created a number of systems of indicators of living standards. As a rule, only three socioeconomic indicators are actually included in the evaluation criteria: unemployment rate, average pay and industrial (agricultural) production level. Other factors, including demographic factors, are left out: mortality rate excess over

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birth rate, population density, gender ratio, migration rate, and others. However, it is the consideration of all factors that makes it possible to envisage the development strategy of the country.

In Ukraine, according to demographic data for 2016 [2]: 459,841 babies were born in the country; 651,619 people died; natural increase over the year amounted to 191,778 people; increase due to migration – 36,651 people; men in Ukraine – 19,532,226; women among the citizens of Ukraine – 22,929,992 people.

Living conditions, the nature of work, leisure, the level of education in the city and in the country are radically different. Citizens have higher social activity and mobility; broad options for education and self-development. At the same time, city residents are characterized by estrangement. Rural communities are characterized by the traditional way of life, informal connections and means of informal control. Countrymen do not feel alienated from people and nature, and their lives are more stable. However, they do not have such opportunities for development and education as in the city. Considering population in the cities and rural settlements in Ukraine, it may be noted that in 2014 – 2018 the number of urban population has more than doubled (table 1).

**Table 1: Urban and Rural Population (people, as of 1 January)**

Structure	Years				
	2014	2015	2016	2017	2018
<b>Ukraine</b>	45 426 249	42 929 298	42 760 516	42 403 027	42 248 129
<b>Urban population</b>	31 339 017	29 675 358	29 584 952	29 482 298	29 371 112
<b>Rural Population</b>	14 087 232	13 253 940	13 175 564	13 102 234	13 015 387

Source: Based on figures provided by [2]

Today, the economic indicators of Ukraine show that it is far behind the countries of the European Union [3]. The key indicators characterizing the social policy of the state and its impact on the development of human capital assets include GDP per capita and human development index. The successful development of the Ukrainian social sphere is complicated due to the following factors: the lack of clear strategic priorities of social policy; insufficient funding; poor social orientation of budget policy; deep social stratification and high polarization in income; incapacity of transfer policy of the state; significant deterioration of demographic characteristics of the population; and deterioration of living conditions. At the same time, the society is restoring its understanding of the self-value of human capital assets, highly developed science, education, culture, health care, which determines the economic future of the country and its possibilities in the world economy.

## 2. PROBLEM FORMULATION AND METHODOLOGY

The basis of further research is the methodological recommendations of the Ministry of Economic Development and Trade of Ukraine, developed to determine the level of demographic security of the country as one of the main components of national security [4]. The integral security indicator can be calculated using the following formula:

$$I_m = \sum_{i=1}^n d_i y_i, \quad (1)$$

where  $I_m$  is the aggregate indicator/subindex of the  $m$  sphere of economic security, where  $m = (1, 2, 3 \dots 9)$ ;

$d_i$  is the weight number that determines the score of the  $i$  index to the integral security index;  
 $y_i$  is the standardized score of the  $i$  indicator.

Methodological recommendations are based on a comprehensive analysis of security indicators with the identification of possible threats in the further development of Ukraine and provide means to identify the level of security components for management decisions on the analysis, averting and prevention of real and potential threats to national interests in the relevant areas.

The parameters of changes in the demographic security of the country and regions are driven by the dynamics of the crude birth rates, mortality, natural increase and migration rates [1]. We consider it appropriate to add indicators that characterize the level of education. Therefore, the indicators and their descriptions are specified below:

1) index of vitality (birth-death). Since the vitality index characterizes the mode of reproduction of the population, which reflects the demographic decline, stagnation or growth, its value equal to one in case the births and deaths over a period are in line is the threshold below which depopulation begins – the natural population decline.

2) total fertility rate. This indicator reflects the number of children that a woman will give birth to on average over the entire reproductive period, with the existing intensity of age and gender fertility. It is sufficiently informative to assess demographic dynamics and its value for the simple replacement of generations with the existing life expectancy and age and gender structure of the population should be equal to 2.14. This is the threshold below which the narrowed reproduction mode is manifested, when each subsequent generation is smaller in number than the previous one.

3) migration efficiency ratio. Amid the steady declining fertility rates, the migration factor is becoming increasingly important. Arriving migrants compensate for natural decline and ensure overall population growth. Therefore, the excess of emigrants over immigrants is an important component of demographic security. The degree of this excess can be determined by migration efficiency ratio, calculated as the ratio of the migration balance to the migration turnover, expressed as a percentage. Migration efficiency of less than 70% cannot significantly improve the demographic and socioeconomic situation.

4) share of illegal migrants in migration growth. At the same time, it is wrong to consider the migration inflow only as a positive phenomenon, since there is such a negative one as illegal migration, which is a negative factor affecting demographic security for a variety of reasons (corruption, shadow market, crime, economic losses for the state budget, social strain). Therefore, to characterize demographic security it is advisable to identify the share of illegal migrants. The author's opinion is that when illegal migrants begin to exceed the number of those who live and work officially and legally in the country, it becomes a threat to security. Hence, the threshold should be considered as 50% of illegal migrants out of all immigrants.

5) share of single-parent families. Currently, in developed countries, the institution of the family is experiencing a serious crisis, which began in the middle of the 20<sup>th</sup> century, characterized by low stability of marriages, families, high divorce rates, an increasing proportion of single-parent, and dysfunctional families. Early 21<sup>st</sup> century was marked by a series of same-sex marriages legalization by a number of European countries, which are not able to fully ensure the reproduction of new generations. The probability of having subsequent children in single-parent, incomplete families is statistically very low, which will

not allow even simple reproduction in the population. If the proportion of such families exceeds one third of the total amount, it will be crucial for the demographic development.

6) average life expectancy, which largely depends on the level and quality of life, which is a security indicator. At the same time, the high life expectancy of the population contributes to the increase in labor longevity and the level of economic activity of the population, and, consequently, the volume of the gross domestic product. But here it should be clarified that according to the standards of the International Labour Organization, the economically active population is between the ages of 14 and 72. Therefore, when determining the threshold of the average life expectancy of the population, it is advisable to use the upper age limit of economic activity, since the majority of the population of older ages is rapidly decreasing this activity.

(7) share of the population over 65 years of age. In all developed countries of the world population is aging, which is caused by the laws of demographic development, the entry of industrial and post-industrial societies in the third phase of the demographic transition. The Rosset-Boget-Garnier scale of population aging developed in the middle of the 20<sup>th</sup> century, taking into account the share of the population over 60 years of age, loses its applicability, because according to this scale there is a very high level of population aging (the share of the population over 60 years of age is 18% or more) in most developed countries. The United Nations uses the 65-year-old age criterion and the population is considered to be old if the proportion of people over 65 years of age is 7% or more.

(8) share of children under 18 without parental care. An important parameter of the demographic situation is the number of children left without parental care. Unfortunately, this indicator is difficult to calculate, but the indicators that are officially published do not express the reality. So far, these are tenths of a percent of all children. Still, this indicator will be crucial if it reaches the threshold, constituting a significant part of the total number of all children in the country – 15-20%.

(9) share of the children born to unmarried women. Somewhat less catastrophic, but still expressing the state of the institution of the family is how many extramarital children are born. This trend is typical for many developed countries, but at this point in general the number of children born to married women is significantly higher – 1.5 to 2-fold. If more extramarital children were born, this would be an increasing pattern; then we can talk about an irreversible crisis of the institution of the family, which will affect the social stability of the state and is a serious threat to demographic security. In this case, the threshold value of this indicator is 50%.

(10) ratio of abortion to childbirth, which along with the high mortality rate of infants and middle-aged people, represents the ongoing depopulation and the existing, irreversible threat to demographic security. The author thinks that the threshold is equal numbers of births and abortions.

11) level of education, which includes the ability to solve creative problems; successful progress through the stages and levels of education, accompanied by the mastery of relevant knowledge, skills and experience, and development of personal potential; adaptation in society through the formation of social competence and access to professional activity [5]. The progress of training is defined as an integral indicator of the ratio of academic progress of

students with the pedagogical progress of teachers as equivalent subjects of the learning process.

(12) education index, which represents adult literacy (two thirds of the value) and the combined gross enrolment ratio (one third of the value). This index shows how many percent of the population can read and write, while the gross enrolment ratio indicates the percentage of students from kindergartens to post-graduate education.

### 3. PROBLEM SOLUTION / RESULTS / DISCUSSION

The input parameters were selected according to the statistical data of Ukraine, the results of their processing are specified in table 2.

**Table 2: Dynamics of the Parameters for the Study of Demographic Security of Ukraine**

Parameters	Years				
	2014	2015	2016	2017	2018
<b>Index of vitality</b>	0,74	0,69	0,68	0,63	0,57
<b>Total fertility rate</b>	1,50	1,51	1,47	1,37	1,40
<b>Migration efficiency ratio, %</b>	47,0	41,5	47,4	72,7	72,7
<b>Share of illegal migrants in migration growth, %</b>	35	38	37	33	30
<b>Share of single-parent families, %</b>	39,4	40,5	28,3	32,7	-
<b>Average life expectancy, years</b>	71,37	71,38	71,68	71,98	72
<b>Share of the population over 65 years of age, %</b>	15,3	15,6	15,8	16,2	16,5
<b>Share of children under 18 without parental care, %</b>	18,8	18,7	17,8	18,0	18,0
<b>Share of the children born to unmarried women, %</b>	21,1	20,6	20,1	20,5	-
<b>Ratio of abortion to childbirth</b>	54	55	53	53	-
<b>Level of education, %</b>	99,9	99,0	98,3	98,4	-
<b>Education index</b>	0,80	0,97	0,96	0,96	-

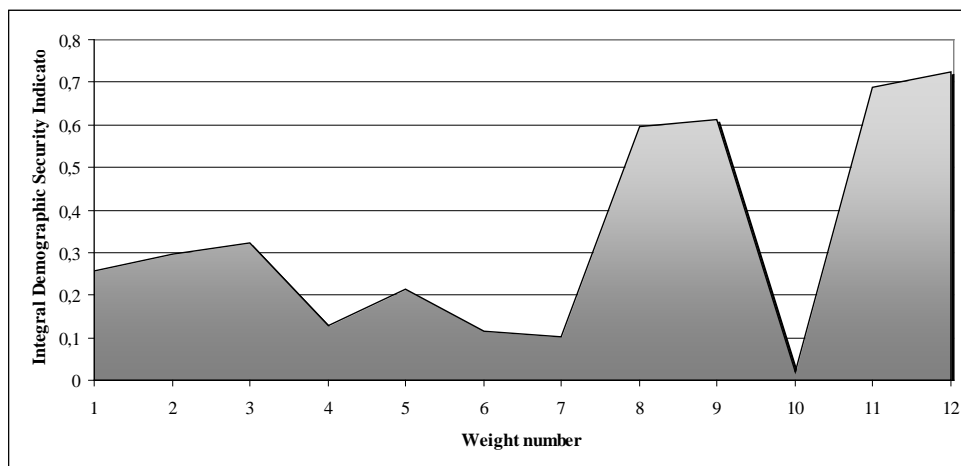
Source: Based on figures provided by [2]

As Table 2 shows, the demographic security indicators evidence a rather ambiguous trend over the past five years. Thus, according to the index of vitality, there is a decrease in this indicator and its value is still below the threshold of simple reproduction of the population, i.e. it is impossible to talk about a significant improvement of natural reproduction. This is also evidenced by the values of the total fertility rate, which is also gradually decreasing but is still at a highly critical level, which is common to the contracted reproduction of the population, i.e. it represents the continuing natural population decline. As for migration efficiency ratio, for the last two years this value has almost doubled. At the same time, it is necessary to take into account the structure of migrants entering and staying to live and work in the country, among which the university-educated specialists amount to fifth; and the ethnic structure of migrants is changing. Illegal migration is quite difficult to track and record, but the data indicate a decrease in this indicator, which is most likely due to the transit location of Ukraine. The next demographic security indicator is the share of single-parent families, where fluctuating values can be found, but the dynamics is still positive. The average life expectancy over five years has increased though slightly, reaching 72 years of age based

on projection data. There is also an increase in the share of the population over 65 years of age, which will continue to grow in the near future amid a low birth rate. The negative trend is the almost stable share of children without parental care, exceeding the normative value. There is a certain interconnection of this phenomenon with the transformation of the institution of the family, marked by a fairly frequent birth of children to unmarried women. The ratio of abortion to childbirth is also almost stable. The last two indicators – the level of education and education index – have quite high values.

The integral indicator of demographic security was calculated using weight numbers determined by expert evaluation. The results of the calculations, according to the above methodology, made it possible to identify the following trend, shown in Figure 1.

**Figure 1: Integral Demographic Security Indicator of Ukraine**



Source: please author's calculations.

Thus, there is a tendency of correlation between the significance of the selected indicator and its evaluation. In general, the integral demographic security indicator evidences the threats, the localization of which should be made by the local and state authorities; the factors that cause the formation of the existing threats, and measures to overcome them were found.

#### **4. CONCLUSION**

Thus, the undertaken study shows the level of demographic security, which is insufficient for the sustainable development of the country. The existing threats to demographic security require a comprehensive and integrated assessment, the identification of the causes and factors of their growth, and, as a result, the intensification of the activities of local and state authorities to create the necessary conditions for the full functioning living of the population, business entities, and social sectors. The main priorities are: the reform of social projects; improvement of an effective judicial and law enforcement system; elimination of systemic corruption that hinders effective state regulation of demographic and migration processes; minimization of differentiation of the population with provision of equal options for access to resources, thereby increasing entrepreneurial activity; transition to an innovative economy, using a system which is an incentive for the development of companies with high-tech and competitive goods and services; reduction in uneven socioeconomic development of regions. In addition, the implementation of these programs will potentiate the demographic policy aimed at increasing the birth rate, reducing mortality in working age, efficiency and

organization of migration processes. In view of this, the implementation of preventive measures will ensure a decent transition of Ukraine to the Fourth Industrial Revolution.

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