

# “Improvement of the method measuring the security of human development: case of Ukraine”

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# IMPROVEMENT OF THE METHOD MEASURING THE SECURITY OF HUMAN DEVELOPMENT: CASE OF UKRAINE

## Abstract

In conditions of instability of economic, environmental, social and other processes that affect human development, the need to prevent their negative impact actualizes the issue of measuring the security of human development. The aim of the study is to highlight the importance of security phenomenon in the context of human development and improve a Human Development Index. In this paper the method of analysis and generalization was used to identify the existing approaches to the human development measuring; also expert evaluations and correlation analysis were used to improve the composite index.

Thus, a method has been proposed for measuring the level of human development security. The peculiarity of this method is phased, three-tier integral measurement of the human development security in terms of the following dimensions: long and healthy life, education, decent standard of living, adjusted to the correction coefficients of prevailing threats for each of the dimensions. The formation of correction coefficients was carried out by identifying the prevailing threats. To illustrate these ideas, data on regions of Ukraine were used and the research period was 2012–2017. The implementation of the proposed method of measurement allows determining the objective level of human development security in the regions of Ukraine and identifying the percentage of lost opportunities. Thus, the study empirically confirms and theoretically proves that human development is a process of enlarging the human opportunities and freedoms, but the dominant threats hinder the expansion of such opportunities and freedoms, that leads to loss of human opportunities.

**Keywords** human development, security, prevailing threats,  
assessment, composite index

**JEL Classification** O15, I00

## INTRODUCTION

The transition of humankind to a new stage of development is conditioned by the priority needs of society. One of the main needs and conditions of the development of society is a complex need of a person for security. Besides the world community's focus on issues related to increasing terrorism, international and national military conflicts, today's world faces the exacerbation of existing problems and emergence of new global challenges, such as environmental, demographic, social, economic, information and technological ones, etc.

For example, one of the most acute problems of modern society is a high level of internal and external migrations, high unemployment rate, low wages, and social inequality. Scientific and technological progress and development of modern industry are greatly damaging the environment, substantially worsening the environmental problems. Thus, the analysis of the statistical data of Swiss Institute reveals that in 2017, there were 301 catastrophes, 118 events of which were

human-made disasters. On the whole, natural disasters have led to economic losses of USD 330 billion, which is almost twice as much as it was last year (Sigma, 2018). According to the latest data from the World Migration Report, there were 40.3 million people displaced within their countries as a result of the conflict in the world and 22.5 million refugees, which is the highest in all time observations (IOM, 2018). There can be seen exacerbation of imbalances in the economic development between the developed countries and the developing ones: 2/3 of the total population worldwide living below the poverty line are from the East and South Asia, and 1/4 – in African countries (OECD, 2017).

Modern reality emphasizes the need to focus on the study of social security, as well as to pay attention to the process of formation and active development of theoretical, methodological and practical bases of the security of human development and its implementation.

## 1. LITERATURE REVIEW

Problems of security and protection under modern conditions are studied in various branches of science and are solved in practice. The theoretical basis of security in the human development paradigm was provided by the specialists of the United Nations Development Program (hereinafter referred to as UNDP) – A. Sen and Mahbub ul Haq. Their ideas were developed in the works of foreign and Ukrainian scholars. So, Seidensticker (2002) continuously studying the theoretical aspects of security in the context of human development. Paying the utmost attention to human development and security, the scientist argues that a new redefinition of security can provide a fresh approach to the balance between socio-economic and civil-political rights. Vorotniuk (2010) and Sukhomlyn (2011) determine the definition of human development security. Ajdari and Asgharpour (2011) considered the security of human development in the context of sustainable development. Shevchenko (2013) discloses the essence of the security of human development concept and describes its structure. The scientist has identified the sources of threats and risks to human development in Ukraine. The role of health care in the protection of human life, the essence of educational security, security of employment, security in the sphere of income are revealed.

Methodological approaches to measurement of human development are presented by the international methodology of measuring the human development – the Human Development Index (hereinafter – HDI), first proposed by the UNDP specialists. The developed methodology is used to compare the achievements in human development

among countries, ranking each state on the unified world scale (UNDP, 1990). This methodology has rapidly gained global significance and worldwide usage, but, at the same time, it has become the most discussed and criticized one (UNDP, 2010). The methodological approaches to measuring human development implemented by the UNDP specialists have given a powerful impetus to researches into improving, acquiring new characteristics, reconsidering and developing new approaches to human development measurement.

A special attention in the field of searching for new approaches to human development measurement should be paid to the project launched by the UNDP Project Office with the Ministry of Regional Development and the Warsaw School of Economics. A group of experts headed by Ivanov and Peleah (2013) proposed a tool for measuring the human development at the local level – the Local Human Development Index (hereinafter – LHDI). The calculation and the three main dimensions of human development presented by the UNDP in calculating the LHDI have remained, but a special attention is paid to the selection of a well-founded set of indicators.

Another attempt to improve the HDI is the Affordable Human Development Index (Ivanov & Peleah, 2013). The peculiarity of methodology is not only complementing the standard HDI with the environmental component, but also including indicators of sustainability in calculations, which allows to take into account the ability to sustain the achieved level of human development.

The scientific novelty of Ivashchenko's (2014) study is the implementation of indicators for stability

in procreation of generations and environmental sustainability. Calculation of the improved HDI makes it possible take into account a number of factors limiting the opportunities for the development of next generations.

In Ukraine, an extremely significant contribution to the development and improvement of Ukrainian methodology of measuring the human development has been made by Libanova (2012), Makarova and Hladun (2012), Khmelevska (2014), and others.

Fundamental research on the development of a national methodological approach was carried out by scientists from Ptoukha Institute for Demography and Social Studies of the National Academy of Sciences of Ukraine under the leadership of Libanova and with the participation of specialists from the State Statistics Service of Ukraine. The methodology is based on the composite Regional Human Development Index. The National Methodology was approved by the Resolution of the Meeting of the Presidium of the National Academy of Sciences of Ukraine and the State Committee of Statistics of Ukraine (2012), which confirms high level of elaboration and practical significance of this methodology.

Within the framework of the decentralization reform and considering the human development as a major goal, the Government of Ukraine ratified the Resolution on some issues of improving the system for monitoring and evaluating the effectiveness of the implementation of the state regional policy (December 20, 2017). In accordance with this resolution, the Cabinet of Ministers of Ukraine developed a methodology for calculating the Regional Human Development Index (as well as the Competitiveness Index). But, in our opinion, a limited set of destabilizing factors in the assessment of long and healthy life dimension and the lack of criteria for choosing such indicators question the validity of this system of indicators, the objectivity and complexity of the measurement. According to Soroka and Kryvtsova (2018), "the proposed methodological approach and measurement results are an attempt to create the tools necessary to support the state social-economic policy in separate regions, and to form regional policy at the national level" (p. 796). We share the opinion

of the scientists, besides, such changes in the measurement system are more often not of social-economic nature, but political motives. Different approaches to the measurement of human development make it impossible to conduct a comparative analysis with the previous national methodology.

Thus, the results of the analysis of the proposed methodological approaches to the measurement of the human development indicate the insufficient consideration of the issue of security and determination of human development objective level. Although the importance of security in the context of human development is objective and proved by scientists at the international level, it is still impossible to timely detect the threats, to assess the real state of the security of human development (hereinafter – HDS) and the level of losses (lost opportunities).

Therefore, paying tribute to the scientific and practical importance of the research on human development, a certain range of tasks related to the influence of the prevailing threats on human development in its evaluation remains topical.

## 2. METHODOLOGY

In this paper, different methods were used. The conducted study is based on the application of general scientific and special methods. Thus, the method of analysis and generalization was used to identify and systematize the existing approaches to measuring the human development; the method of comparative analysis was used to search and generalize the main problems that arise when measuring the level of human development.

The formation of correction coefficients was carried out by identifying the prevailing threats. It was based on the expert evaluation and correlation analysis method. The expert group was formed based on the justification of the number and composition of the experts. Accepting the results validity of 95%, the required number of experts must be not fewer than thirty people. Accordingly, thirty-two people were involved in the study. Expert survey was based on questioning by e-mail. The final set of the prevailing threats was determined based on the correlation analysis. The purpose of

the correlation analysis is to identify high dependence of the component indicators of the prevailing threats for human development and to avoid duplication of some indicators for the formation of the most informative indicators. The output data of the prevailing human development threats for the implementation of correlation analysis are based on the open access statistics over the period from 2012 to 2017.

### 3. RESULTS

In order to create a method for measuring the level of HDS, first of all, it is necessary to define the concept of the security of human development.

The problems of security and its achievement in modern society are investigated in various fields of science and put into practice. In theoretical terms, this problem is analyzed in the studies of scholars in philosophy, sociology, economics, law, etc. Thus, it is obvious that the phenomenon of security is comprehensive and has an interdisciplinary dimension, that is why the category constantly acquires new characteristics.

The dynamic development of society, economy, science and technology, and, at the same time, the growth of instability of such development leads to rethinking of the role of man in the sphere of public life and redefines the essence of security. So, the new realities of the modern world require a slightly different approach to defining the category of security. In our view, in exploring the concept of human development, the security category should be considered not in a static dimension, but in a dynamic one, as a type of dynamic equilibrium of complex self-regulating systems and processes. As nowadays, security should be identified with prevention processes, management and development. Ursul (2013) not only identifies the security with development, but stresses that “security can be ensured not by means of protection, but by the effective implementation of a sustainable development strategy.”

Thus, moving away from the traditional approach of security (military, political, and national security), today’s realities and challenges require a transformation of understanding of the concept:

from state security to human development security. This analysis is the foundation for understanding the essence of security at the present stage of development of society and is, in a sense, kind of theoretical basis for the security of human development.

The concept of the security of human development was first proposed by UNDP specialists in Human Development Report 1994. This was the first international document that focused on the security of human development and substantiated its importance. The theoretical considerations formulated by UNDP experts were adopted as a basis for the concept of human development security promoted by UNDP.

It should be noted that the theoretical principles of human development security are formed as part of a holistic paradigm of human development. Accordingly, the security of human development requires the attention to individual security reasons and obstacles to the realization of human potential. The Human Development Report (1994) reflects these issues in the context of a demilitarized world and focuses on reducing the military spending. So, this concept: (1) is human-centric, (2) has a comprehensive coverage, (3) has a specific focus on prevention rather than counteracting threats. Human, his basic needs, rights, dignity and conditions of existence are put in the spotlight. Thus, human development security aims to promote the human rights, which enhances human development; the essence of this concept is to give priority to freedom in such a way that a person has the opportunity to satisfy his needs, to make choices safely and freely. In other words, the security of human development is not only the expansion of human capabilities, freedoms and choice but also the ability to do it in a safe and free manner.

We propose to define the concept of the security of human development as a balanced dynamic process of enlarging the human’s opportunities and freedoms in order to meet the growing needs, as well as to realize the potential that is constantly being acquired in the process of development for achieving a decent standard of living.

Undoubtedly, the process of HDS is dynamic, and the measuring procedure requires the availability



**Table 1.** Analysis of modern methodologies of measuring the human development

Authors	Methodology	Scale of implementation	Number of initial indicators	Originality of the method
UNDP	Human Development Index	For 188 countries since 1990	4	Unique set of indicators which make the basis for further research on improving the measurement of human development
The Ministry of Regional Development and the Warsaw School of Economics	Local Human Development Index (LHDI)	For regions in Poland since 2012	5	Well-founded set of indicators (the indicators of inputs and outcomes, and indicators for state interference)
Ivanov and Peleah	Affordable Human Development Index	Calculated in Armenia since 2013	10	Taking into account environmental component and importance of including indicators for sustainability
Ivashchenko	Sustainable Human Development Index	No practice of calculations	6	Implementation of indicators for stability of procreation of generations and environmental sustainability
Ptoukha Institute for Demography and Social Studies of the NAS of Ukraine and the State Statistics Service of Ukraine	Regional Human Development Index	Calculated for regions in Ukraine since 2012	33	A composite regional index was developed, which is calculated on six blocks: population procreation, social environment, comfortable life, welfare, decent work, and education. A complex approach of estimation of weight factors for each indicator has been improved
The Cabinet of Ministers of Ukraine	Regional Human Development Index	For regions in Ukraine since 2018	8	Taking into account the effective indicators while measuring human development, and the weight factors for each indicator

ty of an informative set of data, their continuous updating with the aim of complex and objective measurement of the level of human development, taking into account its problematic aspects, formation priorities, identifying the prospective directions of development. Besides, the measurement technology should be easy to use.

Thus, generalization of analysis of the proposed methodological approaches to the measurement of human development (Table 1) indicates the insufficient consideration of the issue of security in determining the human development level. But in the process of analysis, the originality of the method for the measurement of the human development, scale of implementation and number of initial indicators are highlighted, which can be useful in further research.

Devising of a method for measuring the HDS requires the determination of the logic of calculation of a composite index, the results of which would allow determining its objective level. As a composite indicator, it is proposed to introduce the Human Development Security Index (hereinafter – the HDSI). The basis for calculation of the HDSI is the idea that human development is a balanced dynamic process of enlarging the

human opportunities and freedoms, and the prevailing threats hinder this process, which leads to loss of human opportunities (missed opportunities). By definition, the HDSI means the opportunity to measure the achieved level of human development, taking into account the threats that affect it.

The basis of the proposed HDSI is the sub-indices of the standard model of the Human Development Index (formula 1) proposed by the international community: the subindex of long and healthy life, the subindex of education, the subindex of decent standard of living, complemented by correction coefficients (as a set of indicators for prevailing threats) for each of the dimensions:

$$HDI = \frac{SI_{lhl} + SI_e + SI_{dsl}}{3}, \quad (1)$$

where  $SI_{lhl}$  is the sub-index of long and healthy life,  $SI_e$  is the subindex of education,  $SI_{dsl}$  is the subindex of decent standard of living.

The calculation of sub-indices is based on the regional open-access statistics. The set of the indicators for calculating the composite HDI according to the standard model is presented in Table 2.

**Table 2.** Set of the indicators for calculation sub-indices of the composite HDI

Source: UNDP (1990).

Dimensions of human development	Sub-indices of human development	Set of initial indicators
Long and healthy life	Life expectancy at birth	Life expectancy at birth index, years
Education	Education index	Literacy rate among the adult population (%; age of 15 and older) The aggregate share of students
Decent standard of living	GNI per capita (PPP USD)	Gross regional product per capita, UAH

The main indicators for prevailing threats for each of the dimensions were determined by the authors based on questioning the experts and correlation analysis.

The expert group was formed based on the justification of the number and composition of the experts. Thirty-two people were engaged in the survey. Regarding qualitative composition of experts, among the experts of the group there were leading experts, heads of departments of the Ministry of Healthcare of Ukraine, the Ministry of Agrarian Policy and Food of Ukraine, the National Police of Ukraine, the Ministry of Economic Development and Trade of Ukraine, the Ministry of Ecology and Natural Resources of Ukraine, the State Service of Special Communications and Information Protection of Ukraine, scientists of the Institute of Telecommunication and Global Information Space of the National Academy of Sciences of Ukraine, Ptoukha Institute for Demography and Social Studies of the National Academy of Sciences of Ukraine and others. The reasoning behind the choice of the abovementioned institutions is the accumulation of powerful staffing, managerial and scientific potential in regard to formation of HDS (according to its dimensions) in Ukraine.

Thus, the experts were offered a list of thirty-seven threats grouped under the following dimensions of human development: long and healthy life, education, and decent standard of living (Table 3). The list of possible threats to human development for the purpose of determining the most important are based on the generalization of possible threats to human development, as reflected in the works of the following scientists: Vorotniuk and Sushko (2010), Shevchenko (2013), Khazaei, Armanmehr, Nematollahi, Rezaeian, and Khazaei (2017), Khmelevska (2014), OECD (2017), and others. The experts were to determine at what level (high, low, or average) a threat is detected.

**Table 3.** Generalized list of possible threats, grouped under the human development dimensions

Source: Generalized by the authors, based on the researches of Vorotniuk and Sushko (2010), Shevchenko (2013), Khazaei, Armanmehr, Nematollahi, Rezaeian and Khazaei (2017), Khmelevska (2014), OECD (2017) and others.

Dimensions of human development	Possible threats, grouped under the human development dimensions
Long and healthy life	Infant mortality; abortions; teenage fertility; maternal mortality; population morbidity; epidemics of socially dangerous diseases; immunoprophylaxis deficiency; lack of medical staff; lack of quality food (or economic inaccessibility); lack of social programs for healthy adolescence; mortality rate of crime; criminal situation in society; gender and domestic violence; industrial accidents; accidents of natural factors; cases of serious injury and death from traffic accidents; accident of housing stock; military conflicts, hostile activities
Education	Lack of skilled workers in pre-school and secondary educational institutions; reducing the number of secondary educational institutions; territorial unavailability of educational infrastructure and the physical accessibility of educational infrastructure for people with disabilities; reducing the number of higher education institutions; educational emigration; an outflow of scientists from science fields; unemployment among graduates; social exclusion in education (people with disabilities and special needs, other vulnerable groups); lack of financial resources of households for getting quality education; gender inequality among school teachers
Decent standard of living	Unemployment; socio-economic inequality; poverty of the population; forced underemployment; rate of people enforced to work part-time; delays in wage payment; harmful working conditions; emigration of the workforce; inflation

In practice, the formation of human development is carried out under the influence of various destabilizing factors, which is difficult to prevent in time, but with the help of comprehensive measurement of this process, it becomes possible to determine the level of the security of human development, taking into account the threats of such dest-

abilizing factors, determining the degree of their impact, and the percentage of lost opportunities.

The analysis found not only insufficient consideration of the issue of security in the determination of human development level, but also absence of a unified approach to measuring the security of human development. Therefore, it is necessary to solve two important tasks: to develop a unified approach to the measurement and form a comprehensive analytical support for its implementation.

Given the multifaceted nature of the human development process, the development of a methodology for measuring the security of human development is an extremely difficult task. The development of a methodological approach requires determining the logic of constructing an integral index, the results of which would make it possible to determine its objective level. As a composite indicator, we propose introducing the Human Development Security Index. The idea behind the development of the HDSI is that human development is a dynamic process of enlarging the human opportunities and freedoms, but prevailing threats hinder the expansion of such opportunities and freedoms, leading to the loss of human capabilities (lost profits). By its very nature, it means being able to measure the level of human development security already achieved, taking into account the threats that affect it.

Thus, the particular value of the authors' methodical approach to the measurement of the security of human development is to take into account the security aspect, which allows measuring the level and determining the factors that threaten human development, and the level of satisfaction of basic human needs.

The development of a methodological approach to measuring the human development security requires setting of the aim, objectives, and formulation of the research hypothesis. Thus, the main aim of the study is to improve the method of measuring the security of human development. The main objectives of the study are:

- 1) to devise a composite human development index based on the measurement of the main dimensions of human development such as long

and healthy life, education (being knowledgeable) and decent standard of living, taking into account the correction coefficients of prevailing threats;

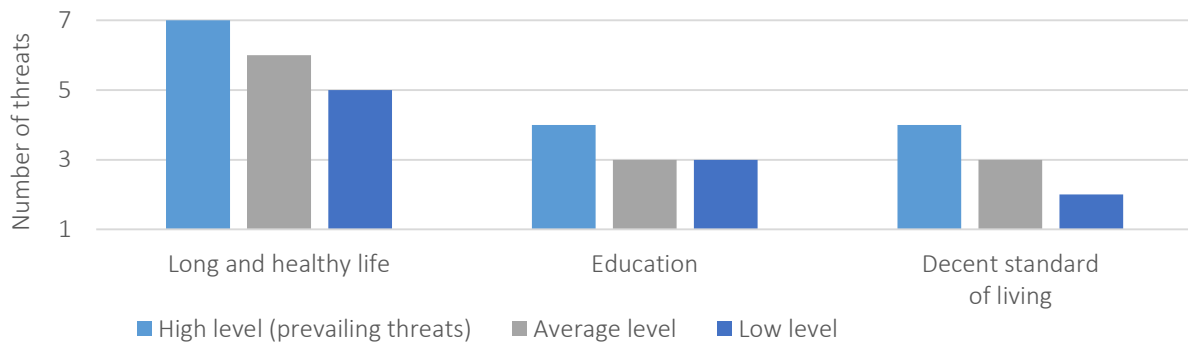
- 2) to calculate the correction coefficients for each of the dimensions of human development;
- 3) to measure the value of the composite index of human development security on the example of Ukraine.

The main hypothesis is that to measure the process of human development security is possible by taking into account the main aspects of human development and the prevailing threats. That is, when measuring the security of human development, a number of indicators characterizing the aspects of human development, as well as the prevailing threats hindering their security will be used.

The main indicators for prevailing threats for each of the dimensions were determined by the authors based on questioning the experts and correlation analysis.

According to the results of the survey, the following prevailing threats in Ukraine have been identified: according to the dimension of long and healthy life – an increase in incidence rate of the population, epidemics of socially dangerous diseases, mortality rate of crime, criminal situation in society, growth in the number of serious injuries, deaths due to transport accidents and military conflicts; as for the dimension of education (being knowledgeable) – lack of qualified staff in preschool and comprehensive education institutions, irreversible educational migration, brain drain, unemployment among graduates of higher education institutions (further – HEI); as for the dimension of decent standard of living – high unemployment rate, high poverty rate, high level of part-time work among employees, delays in wage payment. Thus, the results of the expert survey on the identification of prevailing threats are reflected in Figure 1. The findings of a survey of experts on the identification of prevailing threats need to be taken into account when determining the objective level of the security of human development in the regions of Ukraine.





**Figure 1.** The results of expert survey to determine the number of prevailing threats

To measure the degree of consistency of experts' opinions, Kendall's coefficient of concordance is used. Calculations of the coefficient of concordance for each of the dimensions of human development were made with the help of the software package Statistica 10.0 (nonparametric statistics, Kendall's concordance).

Taking into account the results of the calculations of the coefficients of consistency of experts' opinions (Table 4), it should be mentioned that they are quite consistent.

One of the most important issues is the formation of a set of indicators in accordance with the identified prevailing threats for each of the components of human development. Thus, the main indicators of prevailing threats were formed. The basic principles of selection of primary analytical indicators were: data availability and accessibility; ensuring the reliability of estimates at the regional level; compliance with the specificity of human development problems in Ukraine; sufficiency of static

and dynamic variation; absence of high degree of correlation between the individual parameters.

The final set of indicators of the prevailing threats was determined based on a correlation analysis. The purpose of the correlation analysis is to identify high dependence of the component indicators of the prevailing threats for human development and to avoid duplication of some indicators for the formation of the most informative indicators. Thus, for correlation analysis, an array of baseline data on the indicators of the prevailing threats to human development was formed based on the statistical materials in the open access of the State Statistics Service of Ukraine. The selected indicators have different units of measurement. Therefore, for multivariate analysis, the data must be standardized using the normalization. Furthermore, the collected baseline data on indicators have to be checked, that is why several more formal analyses remain to be done (e.g., detection of outliers, check for normality of indicators).

**Table 4.** Indicators for consistency of experts' opinions and their interpretation according to the dimensions of human development

Source: Calculated by the authors.

Dimensions of human development	Kendall's coefficient of concordance value	Assessment of the value of Kendall's coefficient of concordance	
		Table value $\chi^2$	Calculated value $\chi^2$
Long and healthy life	0.468	44.985	< 299.52
Education (being knowledgeable)	0.464		< 133.63
Decent standard of living	0.487		< 77.92
Explanation	If $W = 0$ , there is no experts' views consistency, if $W = 1$ , the consistency is absolute. Minimum allowable value $W \geq 0.4$	In this case, table value $\chi^2$ is 44.985, (degree of freedom is 31 (32-1) with a probability of 95%)	To check the value of Kendall's coefficient of concordance, the criterion $\chi^2$ is calculated $(m \cdot (n - 1) \cdot W)$

When the indicators are closely interrelated, the qualitative content of the analysis of the real security of human development level is lost, and therefore it will be difficult to interpret the impact on the end result of these indicators. It should be noted that in order to avoid duplication of information between the indicators, through the use of correlation analysis, some of them have been excluded from the primary sample of the prevailing threats of human development. So, we excluded (or combined) the indicators that have high linear relationships (correlation coefficient of more than 0.7) according to the calculated correlation

coefficients. Accordingly, it would be advisable removing the indicator “mortality rate of crime” as more complex, and the informative one “criminal situation in society” is available. The results of this study are the formation of integrated correction coefficients, presented in Table 5.

The HD index is not just a figure calculated based on the selected indicators, it is a complex three-tier structure consisting of several levels: sub-indices and initial indicators. The formula for calculating the composite index of human security (*HDSI*) is as follows:

**Table 5.** Formation of correction coefficients of the security of human development in Ukraine

Source: Developed by the authors.

No.	Dimensions of human development	Prevailing threats	Initial indicators
1	Long and healthy life	1. Incidence rate	(11) Coefficient of tumors incidence among population (12) Coefficient of HIV infection and AIDS incidence (13) Coefficient of mental disorders incidence and behavior resulting from the use of alcohol, drugs and other psychoactive substances
		2. Worsening of the criminal situation in society	(14) Coefficient of committing crimes and felony cases
Correction coefficient		$CC_{lhl} = \frac{\sum_{i=1}^4 I_i}{4}, \quad (2)$ where $I_i$ are indicators for measuring the prevailing threats by the dimension of a long and healthy life	
2	Education	3. An outflow of scientists from science fields	(15) Decrease in the number of scientists
		4. Unemployment among graduates	(16) Unemployment rate among young people
Correction coefficient		$CC_e = \frac{\sum_{j=1}^2 I_j}{2}, \quad (3)$ where $I_j$ are the indicators for measuring the prevailing threats by the dimension of education	
3	A decent standard of living	5. Unemployment rate	(17) Unemployment rate among the population at the age from 15 to 70 (by the ILO methodology)
		6. Rate of people enforced to work part-time	(18) The rate of enforced part-time employment
		7. Delays in wage payment	(19) Wages arrears
Correction coefficient		$CC_{dsl} = \frac{\sum_{n=1}^3 I_n}{3}, \quad (4)$ where $I_n$ are indicators for measuring the prevailing threats by the dimension of a decent standard of living	

**Table 6.** Results of calculation of composite Human Development Security Index in Ukraine

Source: Calculated by the authors.

Regions of Ukraine	Calculated values of HDSI					Absolute deviation			
	2012	2013	2014	2015	2016	2017	2015/2014	2016/2015	2017/2016
Autonomous Republic of Crimea	0.686	0.697	... <sup>1</sup>	... <sup>1</sup>	... <sup>1</sup>	... <sup>1</sup>	–	–	–
<b>Regions</b>									
Vinnitsia	0.691	0.695	0.672	0.684	0.684	0.686	0.012	0	0.002
Volyn	0.691	0.699	0.678	0.679	0.679	0.680	0.001	0	0.001
Dnipro	0.696	0.686	0.668	0.658	0.649	0.653	–0.01	–0.009	0.004
Donetsk	0.704	0.705	... <sup>1</sup>	... <sup>1</sup>	... <sup>1</sup>	... <sup>1</sup>	–	–	–
Zhytomyr	0.670	0.670	0.659	0.650	0.642	0.645	–0.009	–0.008	0.003
Zakarpattia	0.706	0.697	0.700	0.696	0.695	0.696	–0.004	–0.001	0.001
Zaporizhzhia	0.677	0.687	0.660	0.645	0.625	0.629	–0.015	–0.02	0.004
Ivano-Frankivsk	0.692	0.702	0.690	0.686	0.688	0.690	–0.004	0.002	0.002
Kyiv	0.728	0.734	0.713	0.705	0.698	0.700	–0.008	–0.007	0.002
Kirovohrad	0.680	0.681	0.651	0.639	0.635	0.638	–0.012	–0.004	0.003
Luhansk	0.671	0.682	... <sup>1</sup>	... <sup>1</sup>	... <sup>1</sup>	... <sup>1</sup>	–	–	–
Lviv	0.691	0.701	0.684	0.688	0.682	0.675	0.004	–0.006	–0.007
Mykolaiv	0.632	0.649	0.634	0.635	0.627	0.630	0.001	–0.008	0.003
Odesa	0.683	0.685	0.666	0.666	0.658	0.660	0	–0.008	0.002
Poltava	0.709	0.712	0.685	0.666	0.662	0.667	–0.019	–0.004	0.005
Rivne	0.683	0.699	0.688	0.690	0.688	0.690	0.002	–0.002	0.002
Sumy	0.680	0.668	0.654	0.662	0.654	0.659	0.008	–0.008	0.005
Ternopil	0.688	0.698	0.688	0.687	0.679	0.679	–0.001	–0.008	0
Kharkiv	0.732	0.685	0.716	0.710	0.700	0.703	–0.006	–0.01	0.003
Kherson	0.665	0.675	0.664	0.649	0.654	0.657	–0.015	0.005	0.003
Khmelnyskyi	0.690	0.696	0.686	0.683	0.680	0.683	–0.003	–0.003	0.003
Cherkasy	0.677	0.689	0.665	0.669	0.667	0.667	0.004	–0.002	0
Chernivtsi	0.656	0.640	0.694	0.695	0.691	0.690	0.001	–0.004	–0.001
Chernihiv	0.684	0.688	0.674	0.659	0.655	0.659	–0.015	–0.004	0.004
<b>Cities</b>									
Kyiv	0.761	0.763	0.715	0.688	0.674	0.680	–0.027	–0.014	0.006
Sevastopol	0.662	0.688	... <sup>1</sup>	... <sup>1</sup>	... <sup>1</sup>	... <sup>1</sup>	–	–	–
The average value of the HDSI in regions of Ukraine	0.688	0.691	0.678	0.673	0.668	0.670	–0.005	–0.005	0.002
The average value of the HDI in regions of Ukraine	0.716	0.774	0.778	0.780	0.778	0.783	0.002	–0.002	0.005

Note: ...<sup>1</sup> – since 2014, the data exclude the temporarily occupied territory of the Autonomous Republic of Crimea, the city of Sevastopol and the part of temporarily occupied territories in Donetsk and Luhansk regions.

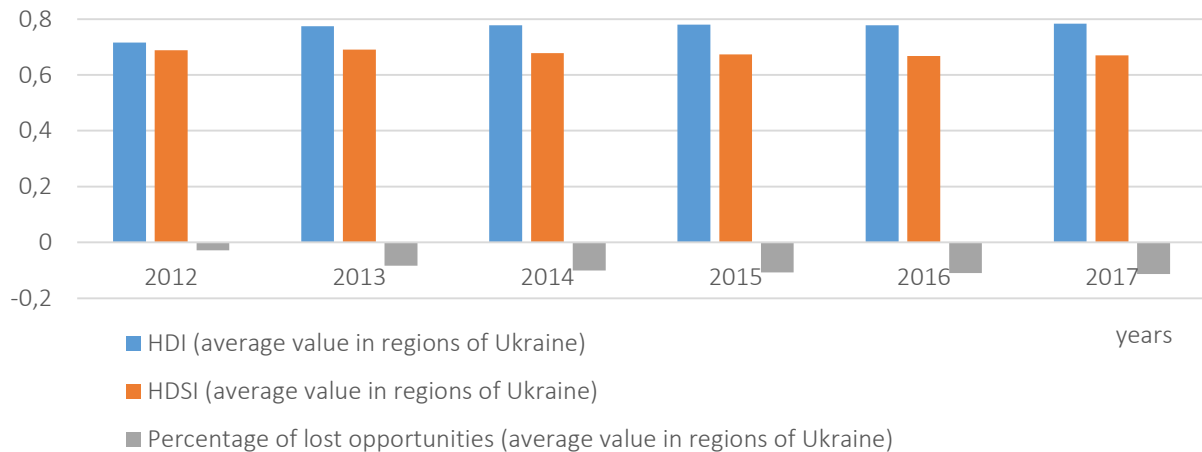
$$HDSI = \frac{SI_{lhl} \cdot CC_{lhl} + SI_e \cdot CC_e + SI_{dsl} \cdot CC_{dsl}}{3}, \quad (5)$$

where  $SI_{lhl}$  – subindex of a long and healthy life,  $SI_e$  – subindex of education,  $SI_{dsl}$  – subindex of a decent standard of living,  $CC_{lhl}$  – correction coefficient of the dimension “long and healthy life,”  $CC_e$  – correction coefficient of the dimension “education,”  $CC_{dsl}$  – correction coefficient of the component “decent standard of living.”

The methodology for calculating a composite HDSI includes the standardization of the indica-

tors. The source of information used to calculate the objective level of human security was the statistical data of the state and sector statistics in the open access over the period from 2012 to 2017, as well as the results of experts’ surveys. The results of the calculation are presented in Table 6.

Analyzing the data in Table 6, it should be mentioned that over the period from 2014 to 2017, the general trend is a decrease in the HDSI, which indicates an increase in the impact of destabilizing factors on the development of human potential in almost all regions of Ukraine. This is the result



Note: Since 2014, the data exclude the temporarily occupied territory of the Autonomous Republic of Crimea, the city of Sevastopol and the part of temporarily occupied territories in Donetsk and Luhansk regions).

**Figure 2.** Dynamics of the calculated values of the Human Development Index (according to the standard model), the Human Development Security Index (according to the proposed model) and the percentage of lost opportunities

of growing uncertainty due to deepening and increasing the frequency of shocks in Ukrainian society: economic, social, political, environmental, etc. However, in 2017, there was a positive trend: the indicator grew on average by 0.002 percent with a slight drop recorded only in Chernivtsi and Lviv regions. On the whole, there are slight fluctuations of the Human Development Index, taking into account the prevailing threats (HDSI) in the regions of Ukraine.

For comparative analysis, Figure 2 shows the average value of the calculated indices for the proposed model (HDSI) and the standard model of the Human Development Index (HDI) in regions of Ukraine from 2012 to 2017. The difference between HDSI and HDI is the percentage of lost opportunities.

A high deviation of the average values of the HDSI from the average values of the HDI in the regions of Ukraine over the studied period is explained by different degrees of influence of destabilizing factors (prevailing threats) in the region. For example, in Ukraine, the level of incidence rate of the population varies in regions: in 2017, in six regions of Ukraine, the incidence rate was from 750 cases per a thousand people and more. In some regions such as Zakarpattia, Poltava, Kherson, Sumy, Vinnytsia, and others, the figure did not exceed 650 cases per a thou-

sand people. In Ukraine, the average incidence rate is 674 cases per a thousand people.

Traditionally, high rates in the regions of Ukraine are observed in the dimension of education, which confirms a significant contribution of the educational component to the HDSI, and shows high educational and qualification potential for innovation development. But the decrease in the number of scientists and the increase in unemployment rate among graduates of higher education institutions prove the inefficiency of the state policy in the sphere of education development.

Despite a high educational and qualification potential acquired, the impossibility of its effective implementation leads to an increase in unemployment rate, the level of enforced part-time employment, and wages arrears. Consequently, as a result of the increasing influence of destabilizing factors in the region, the level of lost human opportunities tends to increase over the studied period.

Thus, research results prove that human development is a dynamic process of expanding the human capabilities and freedoms, but dominant threats hinder the expansion of such opportunities and freedoms, which leads to the loss of human capabilities.

## CONCLUSION

The results of the analysis of human development measurement allow us to conclude that there is a tendency to imitating the international standards (traditional model of calculation of the HDI) when improving the system of indicators or the way of their standardization. This indicates the dynamic development of the human development conception, and an increasing attraction of the attention of the world's scientific community to issues related to its measurement.

An improved method is a necessary tool for determining the objective level of human development security (considering the prevailing threats) and the percentage of lost opportunities with a view to further analysis of the HDS level. The proposed methodology consists of three stages: component analysis (calculation of sub-indices of standard model of HDI), determination of correction coefficients (which were constructed based on an experts' survey that was aimed at identifying the prevailing threats for human development for each of dimensions) and correlation analysis (the purpose of which is to identify the most informative indicators), and the third stage – calculation of the complex composite Human Development Security Index.

The feasibility of the proposed methodical support for assessing the HDS level is justified, which made it possible to identify the powerful and most promising regions of the leadership. The comparative analysis of the average values of the calculated indices by the proposed model (HDSI) and the standard model of HDI in regions of Ukraine made it possible to determine the percentage of lost opportunities. The obtained results demonstrate a significant deviation of the average values of the HDSI in Ukraine during the studied period, which is explained by different degrees of influence of destabilizing factors (prevailing threats).

Thus, in the context of the exacerbation of existing problems and the emergence of new threats, the problem of choosing the optimal ways of further human development was actualized. This puts on the agenda the issue of forming the effective organizational support for the implementation of the concept of human development security in Ukraine. That's why the further development of research problems as the extension to the presented research results can be seen in conducting a deeper analysis of contemporary organizational support for HDS in Ukraine and the most effective foreign models of organizational and communication support for HDS.

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