ployment. The developed models allow us to predict future trends in the labor market, as well as to describe the dynamics of its operation under various alternative scenarios of economic development. Using these developed models within the structure of overall integrated macro models will enable Ukraine to carry out a comprehensive analysis of economic processes in the national economy and its prospects both in the short and in the long run.

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Надійшла до редколегії 05.05.14

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РИНОК ПРАЦІ В УКРАЇНІ: ЕМПІРИЧНИЙ ДИНАМІЧНИЙ АНАЛІЗ З ВИКОРИСТАННЯМ МОДЕЛІ КОРЕГУВАННЯ ПОХИБКИ

У результаті емпіричного дослідження взаємозв'язків між основними макропоказниками функціонування ринку праці в Україні розроблено комплекс динамічних економетричних моделей з використанням механізму корегування похибок. Оцінено довгострокові рівноважні зв'язки та короткострокові ефекти впливу низки чинників. Здійснено прогнозування майбутніх тенденцій на ринку праці, а також проаналізовано різні альтернативні сценарії розвитку економіки.

Ключові слова: ринок праці; економетрична модель корегування помилки; сценарії розвитку; прогнозування.

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РЫНОК ТРУДА В УКРАИНЕ: ЭМПИРИЧЕСКИЙ ДИНАМИЧЕСКИЙ АНАЛИЗ С ИСПОЛЬЗОВАНИЕМ МОДЕЛИ КОРРЕКЦИИ ОШИБОК

В результате эмпирического исследования взаимосвязей между основными макропоказателями функционирования рынка труда в Украине разработан комплекс динамических эконометрических моделей с использованием механизма коррекции ошибок. Оценены долгосрочные равновесные связи и краткосрочные эффекты воздействия ряда факторов. Осуществлено прогнозирование будущих тенденций на рынке труда, а также проанализированы различные альтернативные сценарии развития экономики.

Ключевые слова: рынок труда; эконометрическая модель коррекции ошибок; сценарии развития; прогнозирование.

Bulletin of Taras Shevchenko National University of Kyiv. Economics, 2014, 6(159): 58-64
JEL C5, Q5
UDC 338.1

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ENVIRONMENTAL SECURITY: INTEGRAL ASSESSMENT (CASE OF UKRAINE)

Environmental security is a key issue in the context of the national security evaluating of each state and the world in whole. The lack of universality in the term definition, not to mention the technology of an assessment of environmental security, encourages researchers to develop and improve methods and approaches to assess integrated index of environmental safety at the level of the country and its regions. The main scientific results of this study include the following: given the analysis of the strengths and weaknesses of well-known techniques and approaches to the evaluation of ecological security in the world and in Ukraine, represented the authorial approach to the calculation of the integral index of environmental security of Ukraine and its regions, with the option of cross-state comparison; calculated integral index of ecological safety of Ukraine (1996 – 2013); held the comparative analysis of the ecological security of Ukraine and other selected countries; proposed the system of indicators for ranking of regions of Ukraine at the level of its environmental security.

Keywords: Environmental security, assessment, Ukraine, integral index.

Introduction. Modern economic development, growth and employment, world population increasing create a new challenge – to support the environmental security. The United States were the first state over the world that recognized the necessity to make significant adjustments in the concept of national security, its targets, strategies and tools with accounting the environmental security as an important component of national security [1]. In 1974 M.Taylor [2] firstly emphasized on the fact that the main threat to U.S. national security in developing non-military sphere is beyond the military aspect. A few years later, H. Brown [3] identified among the major threats for the national security such as the economic and environmental threats. In 90s the researchers began to assess the threats of national security that are related with environmental crisis. Exhaustion of global ecological potential was associated not only

with the growth of population, but as well as with the excessive consumption of natural resources and production [4]. Thus environmental security is considered as a part of national security. The basic premise for this [1]:

- global environmental crisis connected with increasing pressures on economic systems and reproductive natural resources of the planet;
- for a state the ecological crisis is linked to the reduction of freedom of political choice due to the transboundary nature of environmental problems;
- worsening of the environmental situation in different regions of the world that causes social and political instability.

These arguments formed the basis for enhancing the status of ecological security to the highest level of national priorities.

The purpose of this research is to consider the environmental security through the prism of its index estimations and to propose more up-to-date assessment technique for the case of Ukrainian environmental security index.

Methodology. Scientists over the world propose different interpretations of the environmental security (ES). Mostly wide broadcasted opinions to the definition of this concept are summarized in Table 1.

Table 1. **"Environmental security": meaning of the term in the scientific literature**

Source	Description
Andreitsev V. [5]	The state of social relations which guarantees the protection of citizens' rights to have the safe environment for their lives and health, provides the regulation of environmentally hazardous activities and the environmental degradation preventing
Barnett J. [6]	Complex of activities to minimize the anthropogenic threats to functional integrity of the biosphere
Hetman A. [7]	The management process that consists of the implementation of economic, organizational, legal, logistical, educational and other measures to neutralize the threat to the vital interests of human and the environment from adverse effects of economic and other activities, natural and man-made disasters and its consequences.
Kachynskyi A. [8]	The complex system process that manifests itself in the interaction of natural, economic and social factors
Lipkan V. [9]	The component of national security, the management of the national security system under which state and non-state institutions are provided with the ecological balance. There are guarantees of protection of a habitat, the population and the biosphere as a whole, the species composition of flora and fauna, natural resources, health and livelihoods; excluded consequences of this effect for the present and future generations.
Orlov A. [10]	The protection against the possibility of destruction (complete or partial) of the human environment, plants and animals as a result of uncontrolled economic development, technologic lagging, natural disasters and man-made accidents
Reymers N. [11]	The set of states, events and actions that ensure the ecological balance on the Earth and in its regions
Zerkalov D. [12]	The state of protection of individuals, society and a state from the effects of natural disasters and human impacts on the environment

Source: author's compilation

There are thousands of similar definitions like mentioned latter and most of them are collected in categories according to the Millennium project [1996; http://www.millennium-project.org] but we can sum up in one simple sentence the main scope of environmental security: the main objective of ES at the state level is to achieve sustainable development with the creation of an enabling and comfort environment for life and reproduction of inhabitants, ensuring the protection of natural resources, prevention of industrial accidents and disasters. Reaching of such main objective is impossible without calculative techniques, as we have to see where we are now and what way and in what speed to move, to see results of our steps. This quite simple understanding of ES concept is highly ambiguously realized in the assessments techniques of different states [13].

The best known global ecological security index is an international environmental index (Environmental Performance Index (EPI)), comprising by experts in the field of environment at Yale University, USA [14]. EPI is constructed through the calculation and aggregation of 20 indicators reflecting national-level environmental data for 178 states (EPI 2014). These indicators are combined into 9 issue categories, each of which fit under one of two overarching objectives: environmental health and ecosystem vitality [15]. The most valuable in this research is the development of weight scale to show the importance of each component in the integral assessment of EPI (Table 2).

Table 2. **EPI compounds and its weights**

Objective (weight*)	Issue Category (weights**)	Indicator (weights**)
Environmental Health (0.4)	Health Impacts (0.33)	Child Mortality (1)
	Air Quality (0.33)	Household Air Quality (0.33)
		Air Pollution – Average Exposure to PM2.5 (0.33)
		Air Pollution – PM2.5 Exceedance (0.33)
	Water and Sanitation (0.33)	Access to Drinking Water (0.5)
		Access to Sanitation (0.5)
Ecosystem Vitality (0.6)	Water Resources (0.25)	Wastewater Treatment (1)
	Agriculture (0.05)	Agricultural Subsidies (0.5)
		Pesticide Regulation (0.5)
	Forests (0.1)	Change in Forest Cover (1)
	Fisheries (0.1)	Coastal Shelf Fishing Pressure (0.5)
		Fish Stocks (0.5)
	Biodiversity and Habitat (0.25)	Terrestrial Protected Areas (National Biome Weights) (0.25)
		Terrestrial Protected Areas (Global Biome Weights) (0.25)
		Marine Protected Areas (0.25)
		Critical Habitat Protection (0.25)
	Climate and Energy (0.25)	Trend in Carbon Intensity (varies according to GDP)
		Change of Trend in Carbon Intensity (varies according to GDP)
		Trend in CO_2 Emissions per KWH (0.33)

Source: Author's compilation on the base of 2014 Environmental Performance Index (2014 EPI) – Backcasted Indicator Scores (http://epi.yale.edu/downloads), where

* These weightings do not reflect a preference for Ecosystem Vitality over Environmental Health, but rather reflect the underlying variance of the scores to achieve a 50-50 correlation of each objective score to the overall EPI score.

** Weightings may vary depending on whether an indicator is included for a country

EPI is finally calculated according the formula: **EPI = sum (xi*ai),** where x_i – a norm-based score, i – an indicator of state, a_i – the weight of score (according to Table 2). The norm-based score calculation is realized according the formula:

$$x_i = \frac{r_i - d_i}{r_i},$$

where r_i – the difference between the best and the worse value of the score in the whole list of states; d_i – the difference between the best value of score in the list of states and the fact value of the score for the i-th state.

This approach to the integral index of environmental security calculating is characterized by absolute transparency and scientific validity. After EPI assessment the country is assigned in one of 5 groups: the strongest, strong, moderate, weak and the weakest according to its environmental protections. In 2012 the largest index of environmental safety was calculated for Switzerland (76.7), Latvia (70.4) and Norway (69.9), the worst environmentally protected countries were Uzbekistan (32.2), Turkmenistan (31.8) and Iraq (25.3). Ukraine took 102[d] place among 132 countries in the world and belongs to the fourth group of countries with the weak environmental protection. In 2014, with the score 49.01, Ukraine came to the 95[th] place out of 178 states that can be considered as an increasing tendency for the last 10 years (http://epi.yale.edu/epi/country-profile/ukraine). The trend of EPI estimations according to the mentioned methodology is stable and slightly increasing (Fig.1). However this slowing scribing trend looks low-speeded for moving in next "league" and the time series forecast allows only **49.57** scores if the tendencies stay same.

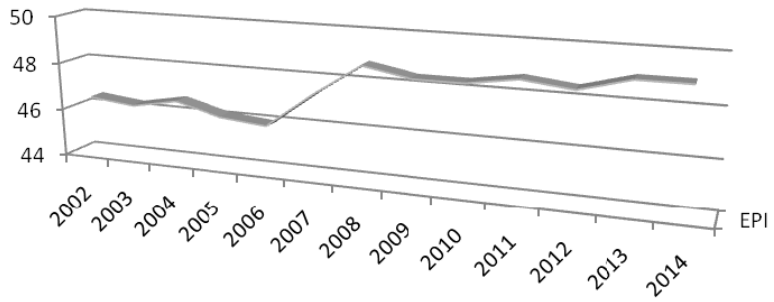

Fig. 1. EPI dynamics in 2002-2014 for Ukraine

Source: author's compilation on the base of http://epi.yale.edu/epi/country-profile/ukraine

Next rather famous methodic that should be mentioned is the approach of russian economist Sizova A. [16]. As the integral indicator of the ecological security index she suggests the using of the economic damage assessment based on the amount of usage and restoration of natural resources. Each component includes a number of environmental safety indicators (Fig.2). According to this approach, the integral index calculation formula is as follows:

$$I = \frac{\sum_{i=1}^{n} Y_i \cdot U_i}{\sum_{i=1}^{n} y_i \cdot u_i},$$

where Y_i – i-th natural resource damage assessment after the remediation activities; U_i – amount of i-th natural resources usage after the remediation activities; y_i – i-th natural resource damage assessment till the environmental protection activities; u_i – amount of i-th natural resources usage till the remediation activities.

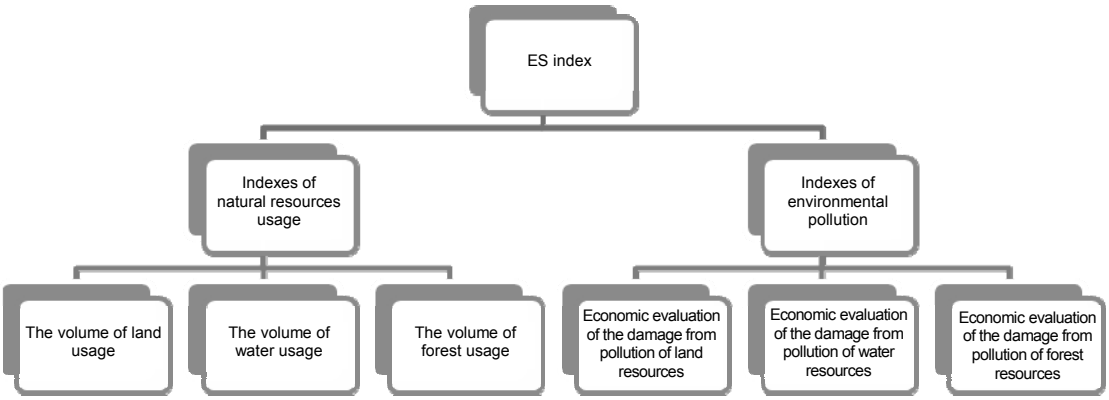

Fig. 2. Compounds of economic assessment of ES

Source: author's compilation on the base of [16]

Despite the objective simplicity of the assessment technique, the main disadvantage of Sizova's method is that environmental security is considered only as an object of economic management, depending on the implemented environmental measures without taking into account other groups of factors that directly or indirectly affect the environment.

As to Ukrainian experience in ES evaluations, the observation of the environment and its level of pollution in

Ukraine are declared in the Article 20 and 22 of the Law of Ukraine "On Environmental Protection" [17]. There is no single approach to the integral environmental assessment. It should also be noted that the Cabinet of Ministers approved the list of indicators of economic and food security however the environmental component is missing there. However, the scientific dissertations and researches are quite often devoted to the idea of the consideration of the ES assessment from different fields, but mostly from economic point of view [18]. The most advertized in Ukraine is the research of scientists who work in the environmental and technological safety department of the National Institute for Strategic Studies under the President of Ukraine. They suggested distinguishing of indicators of the environmental security within such six components [19]:

- *Air* resources (emissions of carbon dioxide; emissions of nitrogen dioxide; density of emissions of ozone-depleting nitrogen oxides; greenhouse gas emissions, per capita; emissions of pollutants from stationary and mobile sources; reducing of emissions of pollutants into the air after the implementation of security measures, thous. t /%);
- *Land resource* (the level of cultivated land (%); the level of land degradation (% of total land area); the share of natural grasslands in the total area of agricultural land (%); disturbed lands; lands that are worked out);
- *Water* resources (GDP water containing (cubic meters/ 1000 USD); public access to the safe drinking water (%); the proportion of recycled water used consistently in total water usage for industrial needs (%); polluted wastewaters without treatment into surface water objects; the general usage of groundwater (%); the rate of loss of water from sewerage network (%); the level of maintenance with treatment facilities (%); the degree of wear of water supply and sewage networks (%); scale of flooded areas);
- *Forest* resource (the level of forestation state (%); the level of restoration of forests (%); the proportion of protected areas (%);the level of natural forest regeneration (%));
- *Waste treatment* (the amount of waste generated per capita (t); the amount of hazardous waste (t); the level of waste disposal (%); accumulation of wastes (%); the level of recycling waste usage (%));
- *Economic component* (public expenditures on environmental protection, in % to GDP; resource capacity of the economy (consumption of natural resources per unit of gross value added); energy intensity of GDP (kg of fuel / USD); investments in fixed assets intended for the construction and reconstruction of environmental protection facilities, purchase of equipment for the implementation of environmental treatment, % of GDP; the level of economic losses of natural and man-made disasters, in % of GDP).

Latter approach has a strong positive sense because of the structuring of ecological safety on separated elements that improves the perception of ES index. However, within this methodology there is not designed the apparatus for the regulation and determination of weighting coefficients for the given parameters, making this method impossible to use in practice objectively.

The reprehensive results of the ES index internal sense and perception can be seen in the methodic approach of Ukrainian scientists G. Obykhod and T. Omelianenko [20]. They determine in structure of the integral index of environmental safety indicators within 7 components:

- the atmosphere (18 indicators),
- water (30 indicators),
- land (10 indicators),
- forests (12 indicators),
- minerals (7 indicators),
- exogenous geological processes (22 indicators),
- waste (18 indicators).

Using classical assessment technique (normalizing of indicators, weighting and liner cumulative assessment) they proposed to determine the weighting coefficients by using the method of principal components, which transforms m-dimensional attributive space in p-dimensional space of components. Thus, the main component of the relationship between the primary features and components is described as a linear combination:

$$y_{ij} = \sum_{j}^{m} c_{ij} \cdot G_j,$$

where y_{ij} – the standardized meaning of i-th attribute with the single variances; c_{ij} – the contribution of the j-th component in the total variance of the set of indicators of i-th sphere. Components of G_j as well are represented by linear combination:

$$G_j = \sum_{j}^{m} d_{ij} \cdot x_{ij},$$

where d_{ij} – load factors; x_{ij} – normalized values of indicators. So, the calculation of the integral index of ecological safety of individual components A_{ij}, taking into account the weight coefficients of each of the indicators included in the group, based on a formula:

$$A_j = \frac{\sum_{i}^{n} b_{ij} \cdot x_{ij}}{n},$$

where b_{ij} – the corresponding weight coefficient; x_{ij} – the normalized value of indicators; n – the amount of indicators in j-th block. While corresponding weight coefficient b_{ij} is calculated like:

$$b_{ij} = \frac{c_{ij} \cdot \left| d_{ij} \right|}{\sum_{j}^{m} c_{ij} \cdot \left| d_{ij} \right|}$$

Finally the assessment of the aggregate indicator of ES is as follows:

$$I = \sqrt[p]{\bigcap_{j=1}^{p} A_j},$$

where A_j – the aggregated indicator of the ecological security of j-th component; *p* – amount of components.

Practical results of G. Obikhod and T. Omel'yanenko for Ukraine on 2012-2013 years gave the evidence that after analyzing the weights of each group in the structure of ecological security, one can conclude the most affective to the level of environmental safety. Thus, the largest share belongs to the block "bowels/minerals" (23.9%), followed by the block "air/atmosphere" – 20.1%. "Land resources", "forest resources", "waste" and "water resources" range from 10 to 15% in the total environmental safety. So the method highlights the environmental insecurity of subsoil/bowels usage at the present.

In the result of the literature analyses of the main approaches to the calculation of the integral index of environmental security, it can be concluded that the best methodology of calculation is a concept developed by Yale University (USA), which objectively describes and evaluates the environmental condition of the states and the world.

In Ukraine, unfortunately, there is still not carried out a comprehensive assessment of environmental safety and there is no single environmental monitoring system. Latter mentioned scientists and other scholars have laid the foundation for further solving problems of ecological safety [20]. However, analysis of the various aspects "research-intensity" in the scientific direction "Environmental Security" indicates terminological uncertainty, general and declarative nature of most proposed methods of ES; the process

of a comprehensive approach that takes into account a wide range of components of hazards; in most cases domination by non-technical and economic methods of regulation of the ES; practical application of the developed concepts and models of limited information indeterminacy, etc. Environmental safety, of course, requires more in-depth development and methodological aspects of the theory, elaboration of scientific basis of management based on thorough research process and formation of conditions of the threats to be clarified, detailed conceptual and terminological apparatus, etc. The first priority for Ukraine should be the development of scientifically sound threshold values of environmental safety, the necessity of developing a common methodology for calculating the cumulative index at the national level.

Results. The latter analysis allows us to pass to the next phase of the study, namely to the realization of economic and mathematical assessment of the environmental security of Ukraine. Having regard to the conclusions drawn in the methodological section of the manuscript, it is necessary to determine the integral indicator of ecological security of both the national and regional levels with the idea to analyze current environmental situation in Ukraine.

We offer own method of calculation of ES index. Assume: a_j – the weight of j-th component of environmental security; a_i – the weight of i-th indicator within the j-th component of environmental security. In Table 3, there are drafted the components of environmental security, basic indicators within the components, weights and impact of i-th indicator on the environmental security, where "+" denotes the positive (stimulating) effects on the ecological safety, "-" – negative (de-stimulative), respectively. In our approach we tried to compile and account positive and grounded sides of all ES techniques that were analyzed.

Table 3. **Integral ES index for Ukraine: assessment technique elements**

№	ES components	a_j	Indicator	Impact on ES	a_i
1	Air resources	0,19	The amount of pollutant emissions, thous.tons	-	0,5
			Emission of CO_2, thous.tons	-	0,5
2	Land and forest resources	0,19	Lands plowed, %	-	0,4
			Reproduction of forest hectares, thous.h	+	0,4
			Reserves and national parks, thous.h	+	0,2
3	Water resources	0,19	Removed water from natural water objects, mln.cubic meters	-	0,3
			Contaminated water resources, mln.cubic meters	-	0,4
			Power treatment plant, mln.cubic meters	+	0,3
4	Waste treatment	0,19	Generated, tous tons	-	0,3
			Disposed (revised), thous.tons	+	0,4
			Removed in designated areas, thous.tons	+	0,3
5	Environmental policy	0,15	The costs of environmental protection,% of GDP	+	1
6	Energy security	0,09	Index of energy security	+	1

Source: author's compilation

Normalization of values is according:

- for stimulators: $z_i = \frac{x_i - \min(x_i)}{\max(x_i) - \min(x_i)}$;
- for de-stimulators: $z_i = 1 - \frac{x_i - \min(x_i)}{\max(x_i) - \min(x_i)}$;

where z_i – the normalized i-th value; x_i – the *i*-th indicator of ES; max and min are taken for the whole analyzed period.

Within each component of ES the index is calculated using the formula:

$$I_j = \sum_{i=1}^{n} \alpha_i \cdot z_i,$$

where I_j – an index of j-th component of ES. And finally, the integral index of ES we propose to calculate according the formula:

$$I = \sum_{j=1}^{6} \alpha_j \cdot I_j .$$

The proposed technique is easy in interpretation if so: ES index can range from 0 to 1, then "0" describes the state of the worst environmental security, "1" – the best, correspondingly. Fig. 3 demonstrates the calculated dynamics of ES for Ukraine in the period from 1996 to 2011 [21].

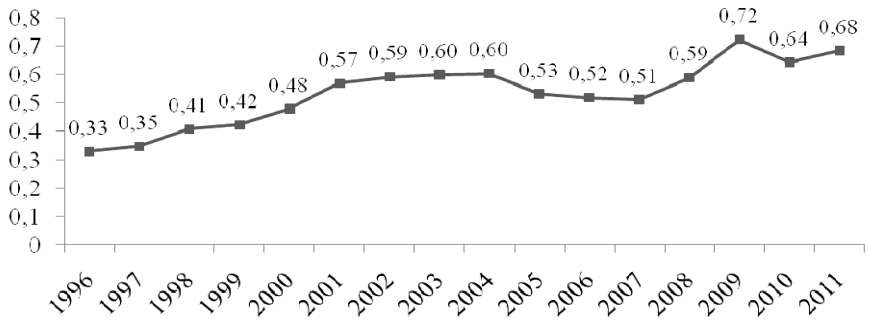

Fig.3. Integral index of environmental security of Ukraine.

Source: authorial calculations on the base of data [22-24]

Fig. 1 and 3 provide the same increasing trend of enhancing the ES in the state. From 1996 to 2004, the level of ES of Ukraine gradually improved, but in 2005, the index began to decline due to the negative trend of increasing emissions of harmful materials (from 2005 index of air began to decrease and reached its minimum in 2007) and the

environmental degradation of water resources. The index continued to decrease until 2007. From 2007 till 2009 there is an increase in the ES index due to the decrease in carbon dioxide emissions, a significant improvement of water resources and increase in forest reproduction. In 2010 the ES index decreasing can be explained with a slight deterioration of all components of environmental security.

To prove the universal and appropriate properties of our technique we implement it for cross-state analyses of ES. To compare environmental security of Ukraine and other countries, it was decided to choose country – geographical neighbors of Ukraine, at that two of the European Union (Poland and Hungary) and two CIS countries (Russia and Belarus). However, we meet the challenge as the system of indicators, which is provided in Table 3, designed to meet the Ukrainian statistical features reporting on the state environment. Each country has its own characteristic statistical reporting indicators of environmental safety, thus we developed a special list of indicators (Table 4), which includes statistical data common to all countries and free available in public access (web-site of the World Bank [22]). In other moments the method keeps same as latter said.

Table 4. **Integral ES index: cross-countries assessment technique indicators**

Indicator	Weighting coefficient
Disposed wastes per capita, kg	0,2
Greenhouse gas emissions in equivalent CO_2 per capita, tons	0,4
Electricity generation by renewable energy resources,% of total	0,2
The level of land degradation,% of total area	0,2

Source: author's compilation

Applying the authorial technique we received the dynamics of the calculated ES indices for Ukraine and CIS countries (Fig. 4). Comparing the environmental security line for Ukraine with the selected CIS states one can agree the fact that between 2005 and 2009 the environmental protection of Ukraine appeared to be stronger. The worst level of environmental safety in recent years shows Russia that caused by a significant increase in carbon dioxide emissions.

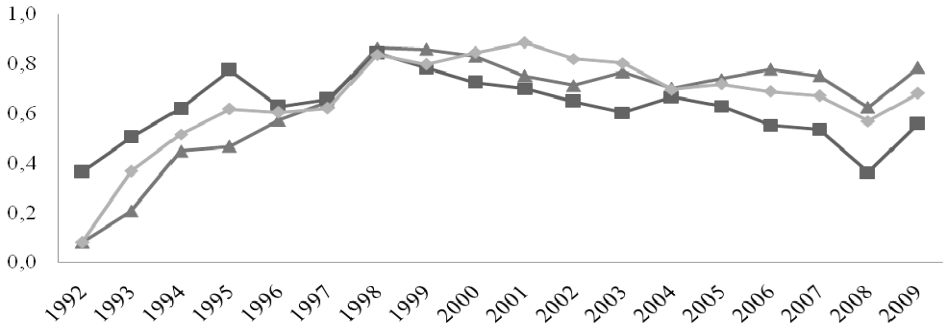

Fig. 4. ES index for Ukraine and CIS states, where blue line – for Ukraine, red line for Russia and green line – for Belorussia

Source: author's calculations

Fig.4 shows the calculated values of the ES indexes of Ukraine and the selected EU states. So, we can result that between 2003 and 2008 years the environmental security of Ukraine was better than in Poland and Hungary, this can be explained by the fact that Ukraine has a better situation with waste management and much larger proportion of power generation by renewable energy – 7%, in comparison with Poland – 1,6% and Hungary – less than 1%.

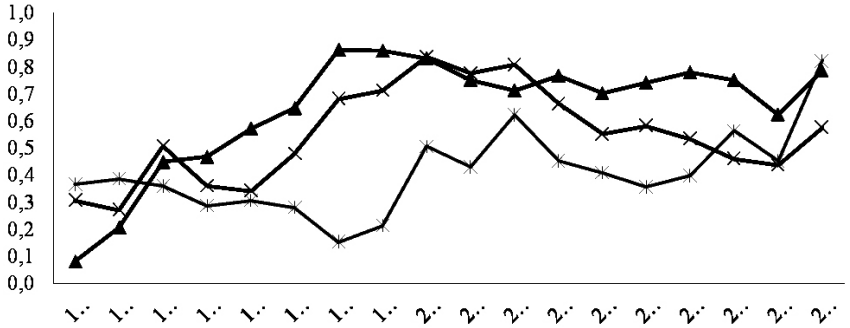

Fig. 5. ES index for Ukraine and EU states, where blue line – for Ukraine, violet line for Poland and yellow line – for Hungary

Source: author's calculations

Beside the positive tendencies in ES index for Ukraine (Fig. 3-5) there are claims that Ukraine is not homogenous in the sense of environmental pollution, and so the security & protection [22; 25-27]. Unbalanced structure and distribution of capacities, diverse character of implemented technologies and production in the regions of Ukraine makes relevant the analysis of the environmental situation of the state in terms of its structural elements – regional sliding. We implemented latter described mathematic technique to the adjusted system of indicators and weights at the level of Ukrainian regions (Table 5).

Table 5. **The system of indicators of ecological safety of Ukraine's regions.**

№	Показник	Weighting coefficient*
1	Emissions per capita, kg	0,105
2	Emissions of CO_2 per capita, kg	0,07
3	Deforestation per 1 sq.km, cubic meters	0,07
4	Park zones per 1 sq.km, hectares	0,035
5	Reproduction of forests per 1 sq.km, cubic meters	0,07
6	Disposed (recycled) wastes, % of generated	0,14
7	Removed pollutants in designated areas and facilities, % of generated	0,105
8	The use of secondary raw materials and waste production, % of generated	0,105
9	The agricultural land, % total lands square	0,06
10	Plow land, as % of total area	0,09
11	Extraction of groundwater per capita, cubic meters	0,05
12	The number of environmental measures	0,1

* received on the basis of correlation analyses
Source: author's compilation

Thus integral index of environmental security was calculated using the formula:

$$I_j = \sum_{i=1}^{12} \alpha_i z_i,$$

where I_j – an index of ES of j-th region of Ukraine; a_i – a weighted coefficient of i-th indicator; z_i – a normalized i-th indicator.

Application of mentioned approach resulted in the following picture of regional distribution according to the level of ES index.

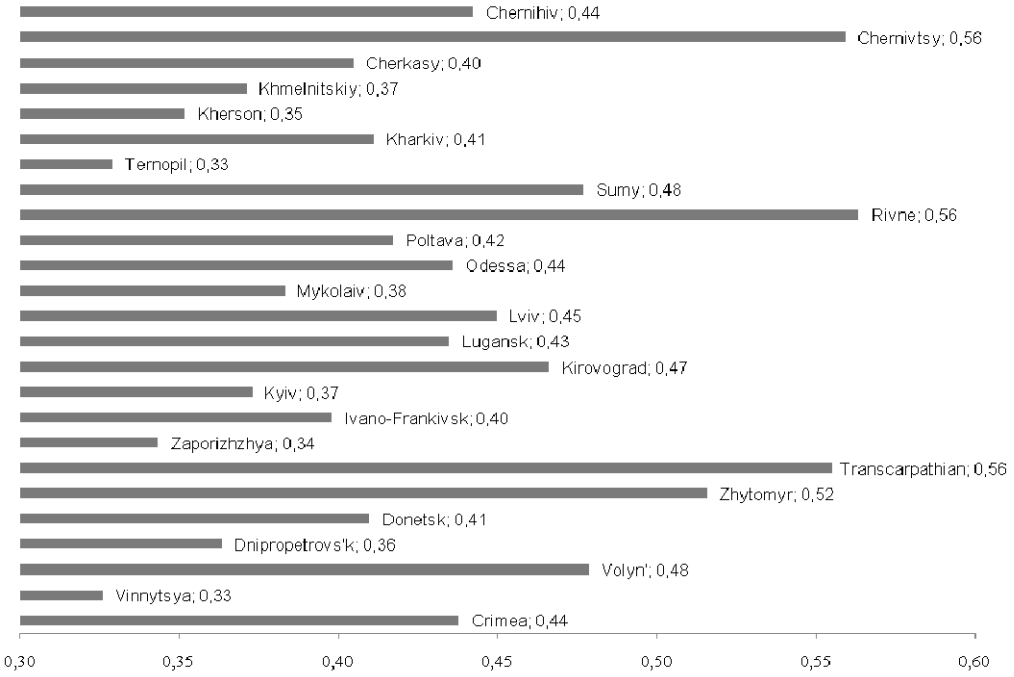

Fig. 6. Integral index of regional ES for Ukraine, dated for 2013 year (Region name, ES index value)

Source: author's calculations on the base of statistical data [23; 28-29]

The integrated assessment can be interpreted in the defining of 5 classes of regional environment in Ukraine (Table 6).

Table 6. **Environmental security of Ukrainian regions: classes**

ES index	Class and state of ES	Regions
More than 0,55	favorable	Rivne, Chernivtsy and Transcarpathian regions
[0,45;0,55)	satisfactory	Zhytomyr, Volyn', Sumy, Kirovograd regions
[0,4;0,45)	stiff	Lviv, Chernihiv, Odessa, Lugansk, Poltava, Kharkiv, Donetsk and Cherkasy oblasts and the Autonomous Republic of Crimea
[0,35;0,4)	critical	Ivano-Frankivsk, Mykolayiv, Kyiv, Khmelnitsky, Dnepropetrovsk, Kherson regions
Less than 0,35	catastrophic	Zaporizhzhia, Ternopil, Vinnytsya region

Source: author's compilation

So, Rivne, Chernivtsi and Transcarpathian regions are characterized with good level of environmental security. For example, Rivne region is characterized by the largest in Ukraine waste disposal in designated areas (17% of total wastes) and is the second, after the Chernivtsy region, in terms of the small emission of pollutants per person. Chernivtsy region also leads in the use of recycled materials and waste production (91% of secondary wastes used

in the production process). The most environmentally hazardous appeared to be Zaporizhzhya, Vinnitsa, Ternopil regions. Zaporizhzhya region produces the largest amount of waste over the state and utilizes it in the lowest rate (utilized only 1% of the total wastes generated). Ternopil region is characterized by the lowest number of implementing environmental measures. As to this indicator, the leader is the Donetsk region (151 environmental activities per year), the companies of the region emit in the air the largest volumes of pollutants (395 kg per person per year). However, particularly CO_2 emissions are the highest for Ivano-Frankivsk region (5.8 tons per capita per year).

Conclusion & Discussion. Thus, in this paper we attempted to analyze environmental security as a combination of certain properties of the environment and created purposeful human activity conditions under which with the certain economic and social factors the risks of human exposure and adverse changes occurring in the environment can be kept at the lowest possible level. The existence of three levels of environmental security (global, regional, local) requires effective management at each of them in order to achieve comprehensive protection of the environment and humans. Environmental threats and crises that exist in the world today and Ukraine claim about the issue of environmental security, not only at national, but also at the global level. Detailed consideration of these issues is particularly relevant to the present history of the world and Ukraine, particularly.

In the paper we attempted critically to compare as the broadly-circled definitions of ES but as well the main approaches to the calculation of the integral index of environmental safety. The best methodology of calculation is resulted to be a concept developed by Yale University (USA), which objectively describes and evaluates the environmental condition of a state and the world generally. Ukraine according to this methodology belongs to the group of countries with weak environmental protection that highlights the necessity of domestic investigations devoted to this topic more intensively. In Ukraine, unfortunately, a comprehensive assessment of environmental safety is not carried out and there is no single environmental monitoring system. The first priority for Ukraine to ensure the safety of the environment should be the development of science-based and uniform methodology for calculating the integral index of environmental safety. Thus, in this research the method of calculating of the integral index of environmental security of Ukraine was proposed with the accounting of positive and negative features of known separate techniques and researches. The calculations of the ES integral index for Ukraine had shown that since 2007, we note the positive increasing trend in the ES index and its maximum value in 2009 – 0.72. But it should be also stressed the fact of a slight drop in the index dynamics in 2010, followed by growth of 0.08 in 2011 to 0.68. The comparative analysis of the environmental safety of Ukraine with the selected EU countries (Poland and Hungary) and CIS countries (Russia and Belarus) had found that in the period 2005 to 2009 the value of the integral index of environmental security of Ukraine is better than in selected countries. The proposed system of indicators for ranking of regions of Ukraine in aspect of the environmental security provided the reasons to believe that the most favorable ecological situation have Rivne, Chernivtsi and Transcarpathian region, and as disastrous are depicted Zaporizhzhya, Vinnitsa, Ternopil regions.

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Надійшла до редколегії 25.06.14

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ЕКОЛОГІЧНА БЕЗПЕКА: ІНТЕГРАЛЬНА ОЦІНКА (НА ПРИКЛАДІ УКРАЇНИ)

Екологічна безпека є актуальним питанням в розрізі оцінки національної безпеки кожної держави і світу в цілому. Відсутність універсальності у визначені самого терміну, не кажучи вже про техніку оцінки рівня екологічної безпеки, стимулює дослідників до розробки та удосконалення методів і підходів оцінки інтегрального індексу екологічної безпеки на рівні країни та її регіонів. До головних наукових результатів даного дослідження належать такі: враховуючи аналіз сильних та слабких сторін широко відомих технік та

підходів до оцінки екологічної безпеки в світі та в Україні, запропоновано власний підхід до обчислення інтегрального індексу екологічної безпеки України та її регіонів з опцією міжкраїнного порівняння; розраховано інтегральні індекси екологічної безпеки України за період з 1996 по 2013 роки; здійснено порівняльний аналіз стану екологічної безпеки України та інших країн світу; сформовано систему показників для ранжування регіонів України за станом екологічної безпеки.

Ключові слова: екологічна безпека, оцінка, Україна, інтегральний показник.

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ЭКОЛОГИЧЕСКАЯ БЕЗОПАСНОСТЬ: ИНТЕГРАЛЬНАЯ ОЦЕНКА (НА ПРИМЕРЕ УКРАИНЫ)

Экологическая безопасность является актуальным вопросом в разрезе оценки национальной безопасности каждого государства и мира в целом. Отсутствие универсальности в определении самого термина, не говоря уже о технике оценки уровня экологической безопасности, стимулирует исследователей к разработке и совершенствованию методов и подходов оценки интегрального индекса экологической безопасности на уровне страны и ее регионов. К главным научным результатам данного исследования относятся: учитывая анализ сильных и слабых сторон широко известных техник и подходов к оценке экологической безопасности в мире и в Украине, предложено авторский подход к вычислению интегрального индекса экологической безопасности Украины и ее регионов с опцией межгосударственного сравнения; рассчитано интегральные индексы экологической безопасности Украины за период с 1996 по 2013 годы; осуществлен сравнительный анализ экологической безопасности Украины и других стран мира; сформирована система показателей для ранжирования регионов Украины по состоянию экологической безопасности.

Ключевые слова: экологическая безопасность, оценка, Украина, интегральный показатель.

Bulletin of Taras Shevchenko National University of Kyiv. Economics, 2014, 6(159): 66-72
УДК 330.341
JEL Q01

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ORGANIC PRODUCTION IN UKRAINE: PROBLEMS AND PROSPECTS IN CONTEXT OF SOCIAL ORIENTED ENTEPRENEURSHIP

Practical realization of sustainable development general conception is passing to the organic production, that allows to satisfy society problems, not putting health and future generations' existence under a threat. At this entrepreneurs, which work in the consumer products' field, must displace accents from economic oriented to social oriented entrepreneurship. The article is dedicated to research negative and positive factors that influence on social oriented Ukrainian enterprises in the sphere of organic goods production. The special attention is attended to the analysis of foodstuffs producers' activity, the results of which have considerable direct influence on consumers' health. The value of informative influences on consumers and producers is analyzed. State support directions of organic goods production, creation of internal market ecologically safe products infrastructure are defined. Recommendations are given according to research results in relation to stimulation social responsibility of businessmen and model forming, which combines interests of consumers and producers, environmental preservation, population health refinement and ecological situation improvement.

Keywords: sustainable development, social oriented entrepreneurship, organic product, organic production.

Introduction. Today our world is an environment where innovations continuously are inculcated and realized. Without new products it is impossible to imagine modern life. In this connection businessmen aim to be creative and innovative, because it has become a necessary operating condition at the market. However it should me mentioned that consumer economics brought to changes of climatic terms and various cataclysms, that, in turn, are accompanied by considerable human and economic losses. For this reason entrepreneurship development must take into account conception of sustainable development, that consists in the necessity of balance establishment between satisfaction of contemporary humanity necessities and defence of future generations interests, plugging their requirement in a safe and healthy environment.

Problem of clean environment and healthy life-style is actual enough nowadays among overwhelming majority of Ukrainian population. Such situation was caused by worsening quality of both agroproducts in connection from application a great amount of chemical and mineral fertilizers for productivity increase and harmful influence on people health various foodstuffs through content in them unavailing and dangerous ingredients. In fact meal consumption is the necessary condition of full life and high level of capacity. For this reason businessmen that deal with food field must displace accents from economic oriented to social oriented etrepreneurship.

The problems of research social oriented entrepreneurship and sustainable development are described in numerous scientific works by foreign researchers such as J.-M.Fortier, B.Huber, A.Lejzerovich, U.Niggli, T.Perris, R.Wiswall [1-2]. Among the Ukrainian specialists it is possible to name such, as Z.Galyshka, I.Komarnutskyi, S.Doroguntsov, V.Tregobchuk. To the range of organic production problems are engage S.Antonec, M.Artush, S.Begej, N.Berlach, V.Gudz, V.Vovk, V.Kisil, M.Kobets, U.Manko, V.Pundys, I.Prumak, M.Rubak, V.Rekynenko, O.Hodakivska, M.Shukyla, I.Shyvar. Role and place of organic production at realization sustainable development main provisions as eurointegration terms and food safety of Ukraine are reflected in researches [3-6], basic factors of global and national levels, which stimulate and restrain development of organic industry in Ukraine are defined in works [7-9].

However questions of organic production development in the context of social oriented domestic entrepreneurship are remained not enough investigated. The modern stage of society development needs elaboration and introduction a new Ukrainian economy model, that envisages combination of consumers interests and products' producers, environmental preservation, improvement of population health and refinement of ecological situation. Organic production in most researches is justly bound to the production of agricultural goods. However organic products are not only foodstuffs. We can also take the wide spectrum of consumer goods, such as cosmetic, clothing, furnitures, hygiene goods and others like that. Therefore the question of input social responsibility touches not only agroproducers, it embraces the representatives of different entrepreneurial activities, a lot of spheres of national economy and must be investigated complex and system.