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**Taina Zavora***PhD**Faculty of Finance and Economics**Department of Finance and**Banking**Poltava National Technical Yuri**Kondratyuk University**Poltava, Ukraine**E-mail: taya\_zavora@mail.ru***Oleg Chepurny***Applicant for a degree**Faculty of Finance and Economics**Department of Finance and**Banking**Poltava National Technical Yuri**Kondratyuk University**Poltava, Ukraine**E-mail: fnpl@ukr.net**Received: January, 2014**1st Revision: March, 2014**Accepted: April, 2014***DOI: 10.14254/2071-789X.2014/7-1/20****FORMING THE DIAGNOSTICS METHODS OF SOCIAL SECURITY CONDITION IN A REGION**

**ABSTRACT.** The article outlines the theoretical principles of social security diagnosis in the region. It also suggests diagnostics methods of social security in the region aiming to study the social condition, existing risks and threats in social sphere. It generalizes social security diagnostics chart.

The article suggests methodical approach to social security diagnosis in the region, focused on identifying the crisis phenomena in socio-economy development process. This approach includes following stages: forming a set of objective and subjective social security indicators; selection of 'the closest' to reference indicators among the benchmarks; the calculation and analysis of indicators and the integral index of social security in the region.

It is ascertained that the necessary condition for social security providing in the region is a realization of substantiated regional social policy.

The main directions for restructuring of social policy in Poltava region should be: social defense of population; effective employment support; funding of the education, improving healthcare level, improving quality of life and preserve the gene pool, providing an environmentally safe living conditions for the population.

**JEL Classification:** R58**Keywords:** social security, social security indicators, risks and threats, Poltava region, Ukraine.**Introduction**

Along with positive changes in social and economic development of Ukraine there are some negative social consequences as well, such as increasing tendency to social stratification, deterioration of demographic situation and health condition of Ukrainian population etc. These are the inner threats to national security of the state in social sphere. Under the conditions of economic globalization and transformation appears the need in reframing of some concepts and specifying some new tasks in social sphere which has for an object to take into account the interests of all layers of the population.

The alterations of priority social interests and the level of threats need corresponding alterations in social policy. In the connection with this it becomes relevant informational

supplying the decision-making in sphere of social policy that should base on diagnostics of social security.

In the first part of the article we studied and systemized the scientific research towards providing social security. And we grounded complexity of diagnostic evaluation process of social security state in the region.

The second part suggests evaluation technique of social security in the region. We substantiated the appropriateness of usage objective and subjective indicators to assess region's social security. And we made the selection among the benchmarks 'the closest' to reference indicators. The characteristic values of social security indicators were suggested as well as their weighing coefficients. And integral indicator of social security in Poltava region was defined.

The third part states that the main precondition for social security provision in the region is a realization of substantiated regional social policy. The main directions for restructuring of social policy in Poltava region should be: social defense of population; effective employment support; funding of the education, improving healthcare level, improving quality of life and preserve the gene pool providing an environmentally safe living conditions for the population.

In order to solve current tasks in the research there was used the set of general and special methods. Such methods as historical and economical were used in justifying the conceptual basis for forming social security. System analysis – was used in the analysis of state the socio-economic indicators and indicators of social security. Expert sociological opinion poll – was used to identify real and potential threats in the Poltava region. Monitoring, comparison method, economic and mathematical methods were used in the diagnostics of the social security state in Poltava region. Statistics – was used assessing indicators of the region's social security.

### **Latest studies and publications sources review**

Theoretical and methodological basis of forming and providing social security in Ukraine has been explored by number of profound scientists and experts (Balanda, 2006; Balanda, 2008; Belyaev *et al.*, 2010; Davydyuk, 2010; Hnybidenko *et al.*, 2006; Ilchuk & Davydyuk, 2013; Kutsenko & Udovychenko, 2010; ed. Libanova, 2010; Novikova, 2003; Methodological recommendations on the evaluation of the economic security of Ukraine edited by The National Academy of Science of Ukraine academician Pirozhkov, S.I., 2003; Skurativsky, Paliy & Libanova, 2003; Veselska, 2010).

The authors emphasize on study state's social security as a part of national security. It reflects the security condition from the inner and outer environment threats. On the one hand the vast majority of researchers emphasizes that social security is a security condition of the state. And from the other hand they point that social security is a set of actions aimed on protection person's interests.

The scientists from the Centre for Advanced Social Research of the Ministry of Social Policy of Ukraine and The National Academy of Science of Ukraine are engaged in the analysis of national security problems in social sphere. They have based theoretical and methodological approaches to social security analysis and specify the national interests of Ukraine in social sphere (Davydyuk, 2010; Ilchuk and Davydyuk, 2013).

They substantiated the necessity of determining the social security degree on separate directions – challenge, threat and limit value for social security. They also defined the relevance of the development process, creation and research as well as gradual implementation the system of socio-economic indicators and the indicators that will determine the status of social security in Ukraine. These researchers proven that development and research mechanism of these indexes and indicators should assist the identification the extent and degree evaluation of social threats in the national security system of Ukraine. They proved that life level satisfaction of the

citizen is defined by the group of general indexes of socio-economy background. The indicators in this group are classified as follows: the degree of incomes differentiation, the falling population's living standards, the delay of wages and pensions, the reducing of real wages.

Methodological and system approaches to the study of social development indicators were explored by O. V. Baidalova, who has grounded the need for efficiency estimation of social development in the region with the help of social indicators (Baidalova, 2012).

She proved the need of region's social security efficiency assessment according to effective social indicators. She emphasized on fundamental importance of indicators choice in the context of regional studies, because they reflect social change in the region. She also made conclusions about the correspondence of criteria system and indicators, which these criteria are measured to social purposes of region's development.

The theoretical basis for principles of social diagnostics in a region as the requisite of government estimation mechanism in social policy sphere have been done by several researchers, like Z.V. Balabayeva, S.V. Ovcharenko, I.L. Roskolotko, N.V. Sokur, L.I. Yakovleva (Balabayeva, *et al.*, 2010).

In their researches they suggested the diagnostics method of social development in the region and determine of social development integral index. The calculation of social development integral index is made by formula of simple arithmetical average demographic development indexes, material well-being, education and the labour market.

Essentially-typological characteristics of the social security in the region are provided by O.I. Ilyash, who has specified the place of the region in the monitoring system of the socio-economical development of the state in the context of providing social security and systematized the main risks of the social component in regional development and suggested the structure scheme of social security study in the region (Ilyash, 2011).

I.P. Moiseyenko proved the essential of the region's social security research aimed on learning about peculiarities of country's socio-economy development on a stage of system transformation. He identified exogenous and endogenous threats for social security and stated causes of problems with social security in the region research (Moiseyenko, 2013).

Meanwhile V.M. Balatsenko asserts about impossibility of effective social security without solving the problems with its measuring. He states about usage of the critical threshold values of social security in Ukraine with taking into account world experience. He claims that among all of the most important indicators Ukraine has crossed the dangerous line. He proved that in government practice the critical threshold values of social security shouldn't be used. And he makes a conclusion about the necessity of development and validation of social security conception in Ukraine (Balatsenko, 2013).

A.A. Haletska made the theoretical analysis of factors influencing on state's social policy. And she offered practical actions in creation of effective security mechanism (Haletska, 2010).

And regional aspect of providing social security was researched by Y.V. Hrabko (Hrabko, 2010).

Nevertheless, despite the relevance of the study in this direction, the diagnostics process of social security in the region has remained complicated, as well as choosing the tools for efficiency increasing the social policy in the region. It's also an urgent issue of social policy reforming informational provision. And it should base on social security diagnostics in the region.

### **Task setting**

The purpose of this scientific research is to develop the diagnostics methods of social security condition in the region. It would allow taking into account socio-economical

processes and well-being of the region's population. And the research would help detecting of existing threats and tendencies in social development.

### Basic material and results

The essential condition of efficient social policy implementation is the well-timed adjustments into the content and forms of social regulation processes from which the social security of a person depends on. The main directions of social policy appear from the necessity to take into account certain social risks and threat, its minimization and prevention. The forming process and implementation of social security actions in the region, the establishment of their priority implementation requires the detecting and analysis of existing threats to social security, scientific justification of decisions concerning reducing of their impact, which has defined the need for the development of diagnostics methods of social security in the region.

The methods include logical sequence for diagnostics implementation of social security condition in the region according to defined stages (*Fig.1*).

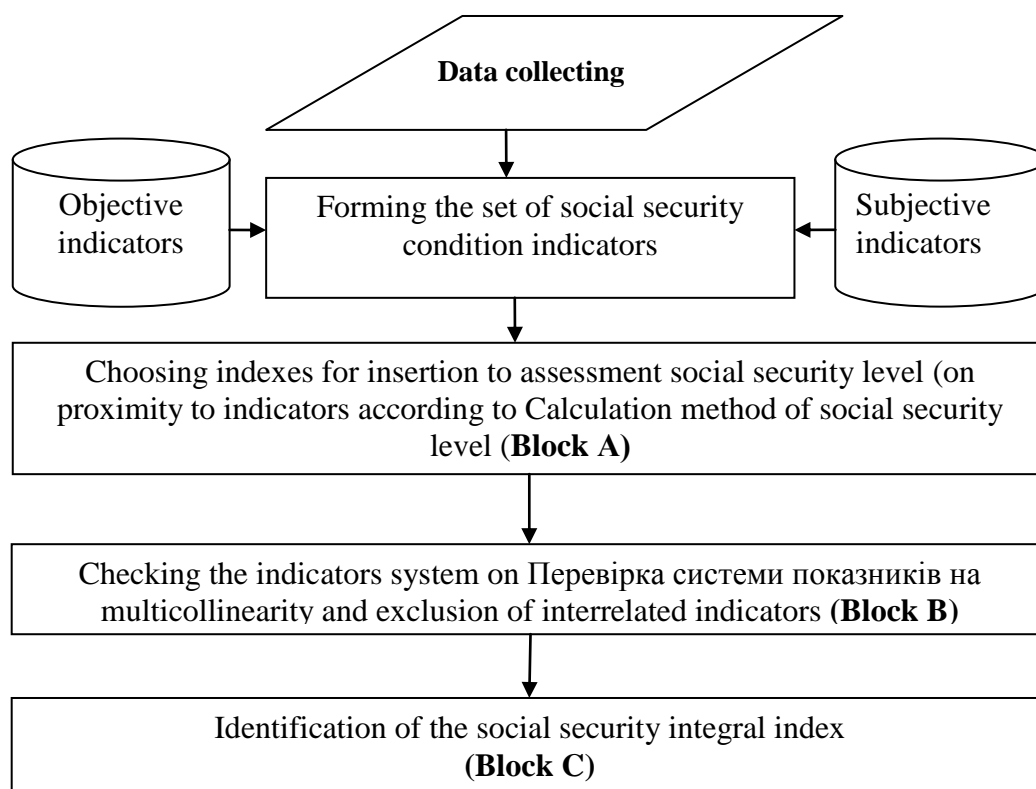


Fig 1. Diagnostic method of social security condition in the region

Source: developed by the author.

The first stage of the diagnostics methods of social security condition assumes identification of crisis and finding correlations based on specified changes in socio-economical development of the region. The main tasks of diagnostics are: effectiveness of socio-economical development systematic assessment; detecting of risks and threats; obtaining comprehensive information about social security condition.

The procedure of conducting the diagnostics research includes: forming the purpose of diagnostics procedure; defining the diagnostics object, research's subject, defining and justifying the system of indicators (criteria), which are the basis for diagnostics procedure;

condition of social security assessment; quantitative and qualitative identification of security condition based on chosen system of indicators (criteria); implying obtaining information in the process of forming the social policy in the region (Zavora & Chepurny, 2012b). The diagnostics of social security in the region assumes using such methods as: expert sociological poll, which has an object to detect potential threats; monitoring which is an information and analysis system of observation on indicators dynamics of socio-economical security and because of serious disproportion and contradiction, lack of bankroll in the state has the particular importance in the diagnostics system; method of comparison that allows characterizing one phenomenon through the prism of another one, to estimate the efficiency of forming social policy and define the deviation of social indicators from their threshold value, to ascertain their reasons; economics and mathematics methods, which allow solving the tasks of economic assessment of observable object based on the probability theory and mathematical statistics.

The particular place in the diagnostics algorithm takes the selection of social security indicators, which characterize the social sphere of the state, region, certain citizen, due to the high degree of informational content connection between tendencies and development processes of socio-economical sphere and the possibility of their usage, which has defined the need for usage as well as objective and subjective social indicators (Chepurny and Zavora, 2012a) To obtain the data about the tendencies of social development in Poltava region, which has an object to provide social security, we have taken the expert sociological poll among 200 respondents from 18 and upward.

The respondents represented different scoops of activity: from education to health and social services, trade, transport and communication sector, financial sector and agricultural, public service and students – 25 people each. They were suggested to answer some questions concerning their assessment of life's quality, employment and adaptation on labour market, social tension, life and health conditions, social security condition, satisfaction with the level of their incomes, educational level, medical care level, dwelling conditions and ecological situation. The purpose of taking the expert sociological poll was finding the region's population attitude to the problems like property inequality, unemployment, crimes. This accomplished subjective estimation in the monitoring process of social development tendencies studies in Poltava region in the social security providing context let us choose the indicators for systematic assessment of socio-economical development in the region (Chepurny, 2013, pp. 86-93).

According to the general diagnostics chart of social security in the region 14 indicators have included into data collecting unit:

1. the portion of the population with the aggregate expenditures lower than 75% of median level in aggregate expenditures;
2. the portion of the population with the aggregate expenditures for 1 person per month lower than the subsistence level;
3. ratio of the average wage to the subsistence level;
4. ratio of the minimum retirement to the subsistence level; ratio of the index of nominal total household resources to consumer price index;
5. ratio of the aggregate expenditures of 10% the most financially secured population to 10% of the least financially secured;
6. the portion of the food cost in total consumer spending cash households;
7. unemployment rate (ILO methodology);
8. long-term unemployment rate of working age;
9. number of first reported cases per 100 persons;
10. availability of housing in average for one person;
11. consolidated budget expenditures on health, percentage of GDP;

12. consolidated budget expenditures on education, the percentage of GDP;
13. coverage of 9th-graders with complete secondary education;
14. according to Method of calculating the level of economic security (social security).

These indicators are generally recognized by most scientists in our country and are used in evaluation practice of social security in the world, and the indicators of social security selected by random social monitoring of respondents in Poltava region as to provide their social security.

Thus there are 2 charts: the chart of education (Chart 1) and the chart of control (factors that can affect the social security). The data collecting unit includes 129 indicators, which affect the level of social security: economical, analysis of demographic, healthcare in Poltava region, that characterize the employment of population; incomes and expenses of population, food consumption, level of education and upbringing, supply of material benefits, antisocial manifestation, environmental condition.

The next step in the process of diagnostics of social security in the region is the selecting the 'closest' to the reference among control indicators and the further conducting the Farrar-Glauber Test; deviation of collinear lines; compiling 'the table of correspondence' on every stage; including into 'the control table' without the preferences to the references (Zavora & Chepurny, 2012b). Defining of (the set of) the factors (24) is due to distance method and establishment the correlation between economic factors and reference.

The second stage in the diagnostics of social security in the region assumes, using the method of evaluating the economic security, determination the integrated indicator of social security in the region. At first, when set of indicators is formed, carry out the procedure for determining the characteristic (optimal, threshold and boundary) values of the indicators, followed by normalization of the indicators of social security (*Table 1*).

Determination the threshold values of the indicators of social security is accomplished by considering MESU techniques and methods defined by Methodological recommendations on the evaluation of the economic security of Ukraine, edited by The National Academy of Science of Ukraine academician Pirozhkov, S.I., sociological polls of respondents in Poltava region, expert assessments of social security indicators, which designed to assess the state of social security of Poltava region population.

Table 1. Characteristic values of the social security indicators and their weighting coefficients

N i/o	Indicators	Lower boundary	Lower threshold	Lower norm	Upper norm	Upper threshold	Upper boundary	Threshold value	Weighting coefficient
		( $X_{bn}^l$ )	( $X_{thr}^l$ )	( $X_{opt}^l$ )	( $X_{opt}^u$ )	( $X_{thr}^u$ )	( $X_{bn}^u$ )	( $X_{opt}$ )	$a_{ij}$
1	2	3	4	5	6	7	8	9	10
1	Portion of the population with the aggregate expenditures lower than 75% of median level in aggregate expenditures (level of poverty), %	0	5	10	15	25	30	no more than 25	0,0471
2	Portion of the population with the aggregate expenditures for 1 person per month lower than the subsistence level; %	5	15	25	30	40	60	no more than 40	0,0441
3	Ratio of the average wage to the subsistence level, times	1	3	4	5	7	15	no less than 3	0,0441
4	Ratio of the minimum retirement to the subsistence level, times	0,14	1	1,5	2	2,5	3	1,5-2	0,0459

5	Ratio of the index of nominal total household resources to consumer price index, times	0,7	1	1,5	2	3	4	no less than 1	0,0453
6	Ratio of the aggregate expenditures of 10% the most financially secured population to 10% of the least financially secured, times	3	4	5	6	8	10	no more than 8	0,0436
7	Portion of the food cost (foodstuff and eating out), in total consumer spending cash households %	20	30	35	45	50	70	no more than 50	0,0482
8	Unemployment rate (ILO methodology), %	0	3	5	8	10	15	no more than 10	0,0471
9	Long-term unemployment rate of working age, %	10	15	25	30	40	50	no more than 25-30	0,0395
10	Number of first reported cases per 100 persons	10	20	30	50	60	80	no more than 60	0,0453
11	Availability of housing in average for one person, m <sup>2</sup>	6	13	25	30	40	50	25	0,0418
12	Consolidated budget expenditures on health, percentage of GDP	1	2	3	4	5	6	no less than 4	0,0389
13	Consolidated budget expenditures on education, the percentage of GDP	3	4	7	8	8,3	10	no less than 8,3	0,0453
14	Coverage of 9th-graders with complete secondary education, %	90	95	98	99	100	100	no less than 100	0,0321
15	Gross regional product per capita, UAH	5000	10000	20000	35000	45000	50000	no less than 35000	0,0598
16	Consumer Price Index (December till previous December), %	102	103	105	107	109	111	no more than 105	0,0277
17	Economically active population (aged 15 – 70), thousand .units	710	720	730	740	750	760	no less than 750	0,0360
18	Demand for labour, persons	2000	3000	4000	5000	6000	7000	no less than 8000	0,0381
19	Disposable income per capita, UAH	3000	5000	10000	20000	30000	40000	no less than 30000	0,0381
20	Average monthly nominal wage of employees, UAH	400	600	1000	2000	3000	4000	no less than 4000	0,0434
21	Characteristics of the regional human development	0,45	0,5	0,55	0,6	0,65	0,7	no less than 0,6	0,0459
22	Ratio of minimum wage to the average wage, %	15	30	40	45	50	55	no less than 50	0,0287
23	Total fertility rate (per 1000 of current population)	5	6	7	8	9	11	no less than 10	0,0314
24	Share of realized innovative products in the total industrial, %	0,5	1	3	15	25	40	no less than 30	0,0426

*Source:* own calculation based on Zavora & Chepurny, 2012b.

For weights coefficients' determination is used the principal component model. It transforms the m-dimensional feature space into p-dimensional space of components ( $p < m$ ).

Model building of principal components is accomplished with the help of the PAP Statistics in three steps (Fig. 2, Fig. 3).

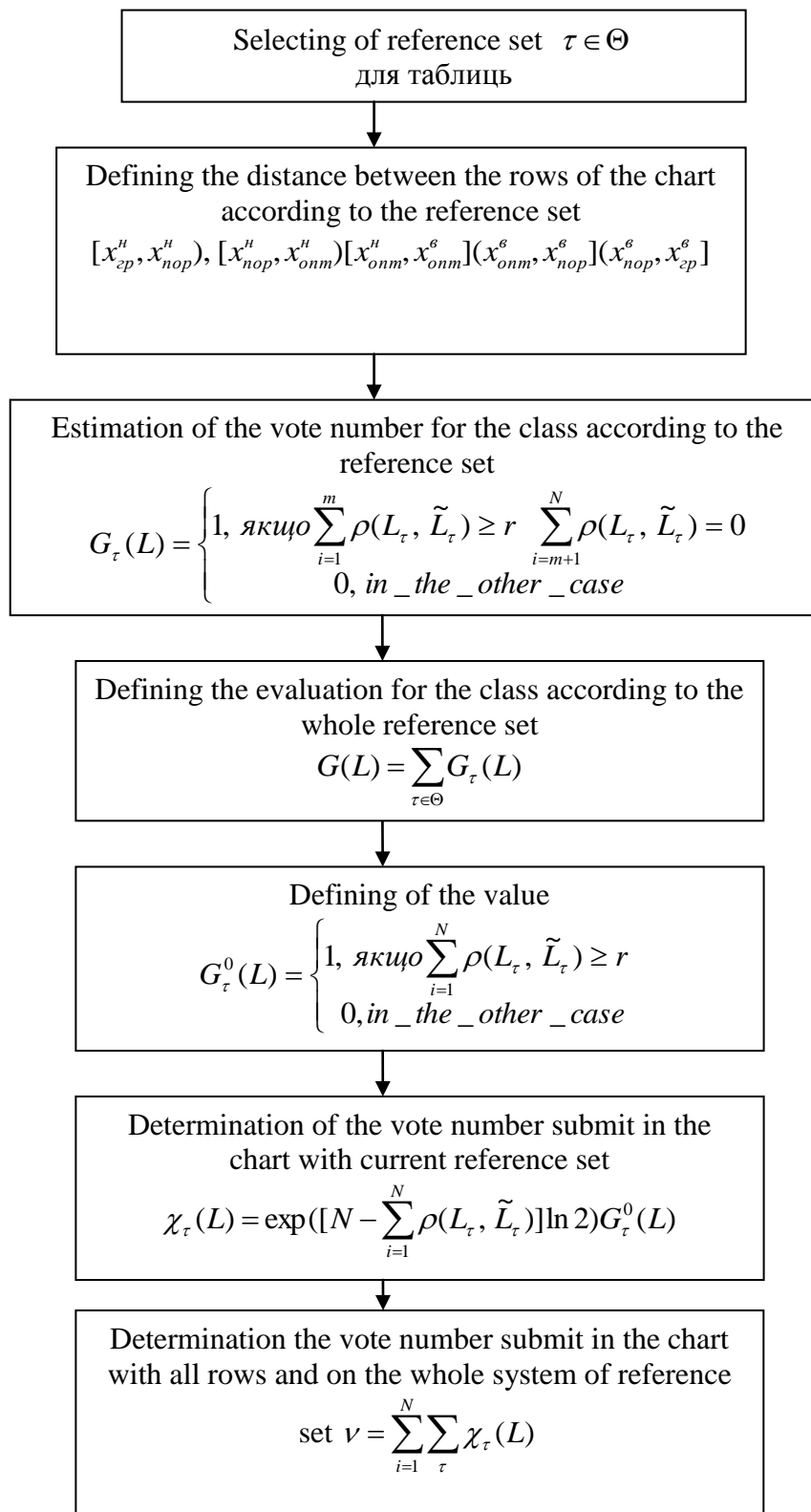


Fig. 2. Flow-chart of the selection algorithm for indicators included in evaluation of social security level in the region

Source: developed by the author.



The algorithm that tests the indicators system on multicollinearity and exclusion of interrelated indicators is shown on Fig. 3.

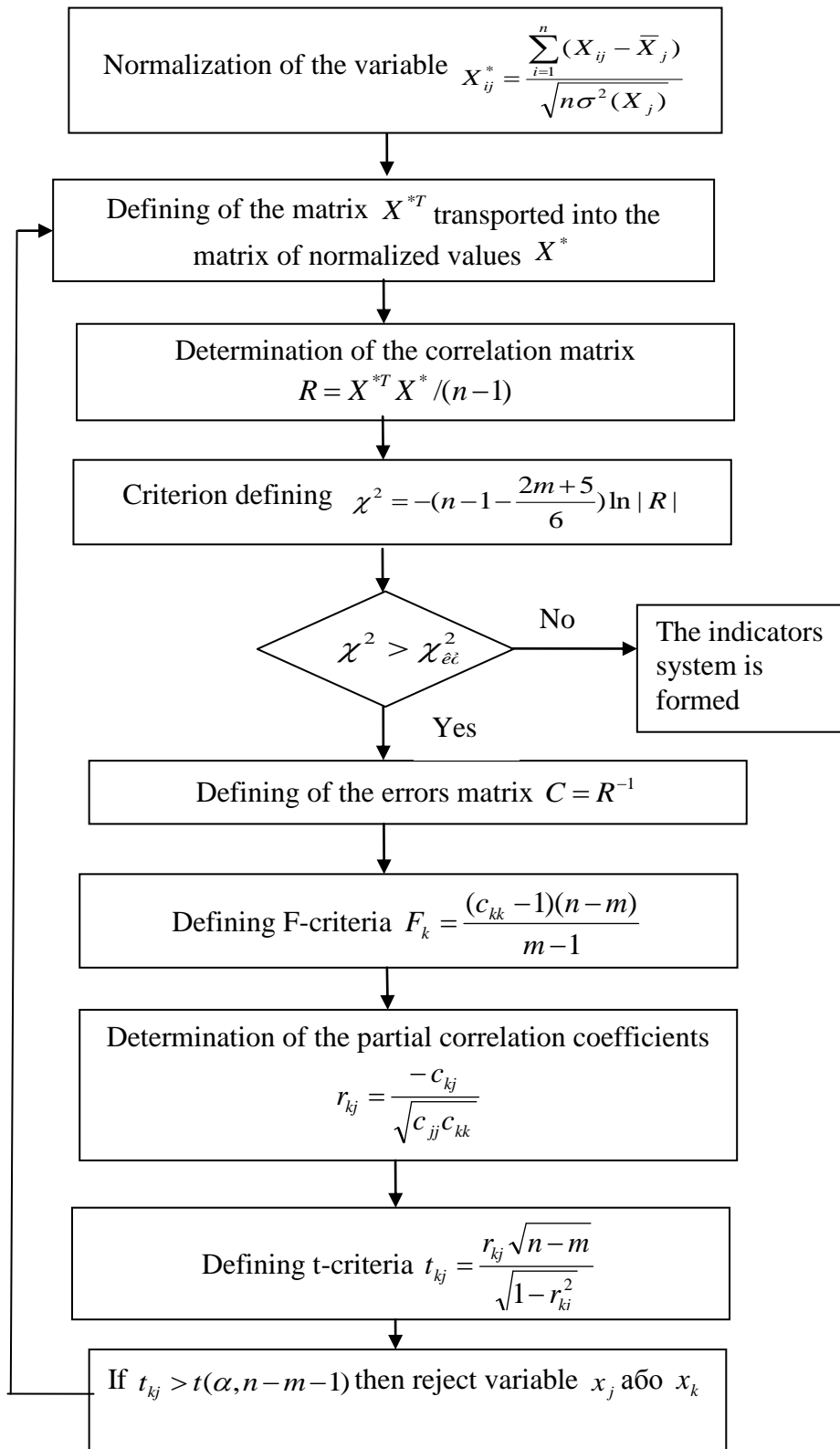


Fig. 3. Flow-chart of the testing indicators system algorithm on multicollinearity and exclusion of interrelated indicators

Source: developed by the author.

The calculation of the integrated indicator of social security is accomplished with two methods according to the Method of calculating the level of economic security of Ukraine (Ministry of economy of Ukraine, 2007). Calculating the integrated indicator for the first method of calculating normalized values of indicators based on a formula:

$$I_{j1} = \sum a_{ij} z_{ij1}, \quad (1)$$

where  $a_{ij}$  is the weight coefficients that determine the degree of contribution of the  $i$ -th indicator into the integrated indicator;  $z_{ij1}$  is the normalized values of the input indicators  $x_{ij}$  calculated with the first method.

As the calculation of indicator does not require the complex algorithms and software for finding them, it is enough to use built-in functions and macros of Excel processor. Calculating the integrated indicator with the 1st method can be performed by using the formulas shown in Fig. 4.

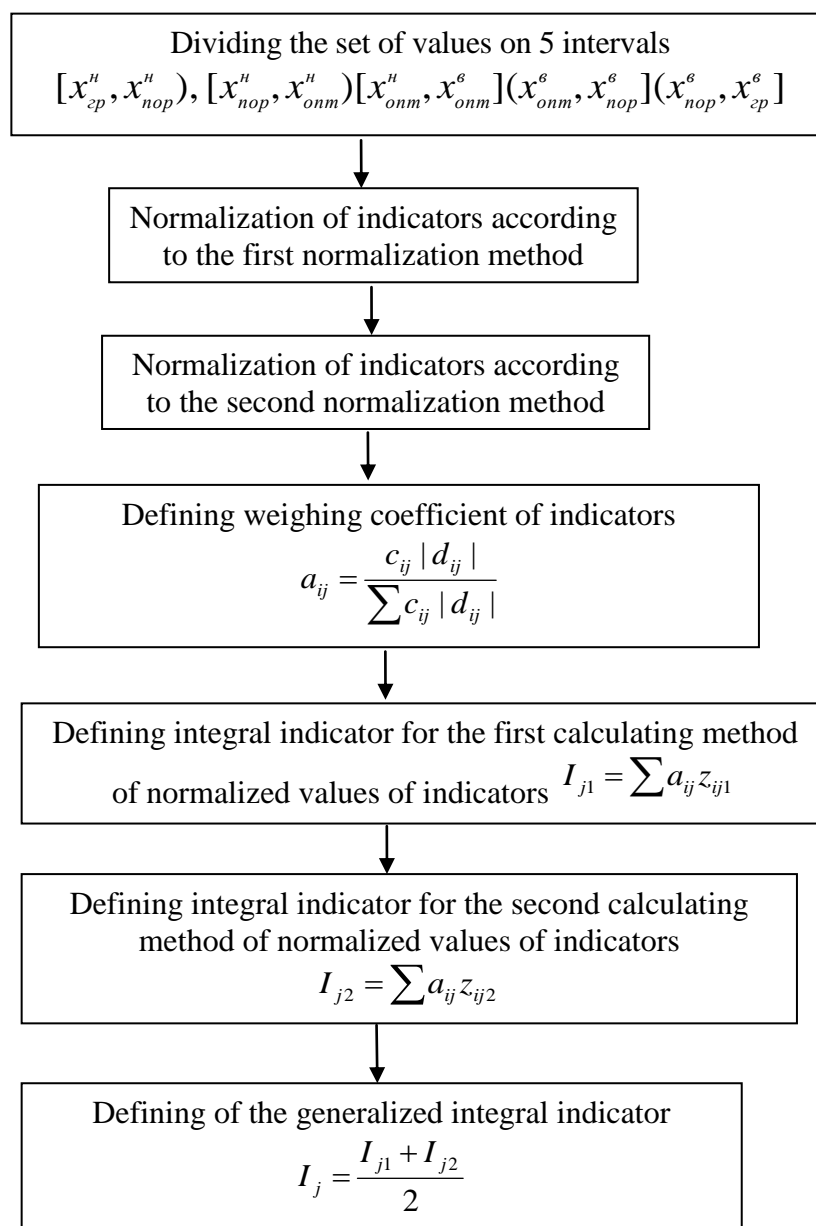


Fig. 4. Flow-chart for defining algorithm for integral indicator social security level in the region

The results of calculating the integrated indicator of social security condition in Poltava region for the first method the years 2003-2011 is shown in *Table 2* using the formula

$$Z_{ij1} = \begin{cases} X_{ij} / X_{opt}, \text{ if the indicator is a stimulator} \\ X_{opt} / X_{ij}, \text{ if the indicator is a destimulator.} \end{cases}$$

Table 2. The results of calculating the integrated indicator of social security condition in Poltava region for the first method the years 2003-2011

N i/o	Indicators	Year								
		2003	2004	2005	2006	2007	2008	2009	2010	2011
1	2	5	6	7	8	9	10	11	12	13
1	Portion of the population with the aggregate expenditures lower than 75% of median level in aggregate expenditures (level of poverty), %	0,839	0,89	0,842	0,845	0,929	0,977	0,947	1	0,984
2	Portion of the population with the aggregate expenditures for 1 person per month lower than the subsistence level; %	0,947	0,992	1	1	0,936	0,906	0,868	0,865	0,868
3	Ratio of the average wage to the subsistence level, times	0,427	0,517	0,597	0,68	0,78	0,883	0,823	0,8	0,867
4	Ratio of the minimum retirement to the subsistence level, times	0,065	0,635	0,39	0,37	0,355	0,375	0,355	0,415	0,39
5	Ratio of the index of nominal total household resources to consumer price index, times	1	1	0,97	0,95	0,94	0,96	1	0,98	0,95
6	Ratio of the aggregate expenditures of 10% the most financially secured population to	0,706	0,822	0,938	0,938	1	1	1	0,845	0,889
7	10% of the least financially secured, times	0,87	0,904	0,923	0,947	0,924	0,931	0,954	0,936	0,967
8	Unemployment rate (ILO methodology), %	1	1	1	1	1	1	0,98	1	1

18	Demand for labour, persons	0,421	0,626	0,668	0,576	0,769	0,351	0,36	0,225	0,303
19	Disposable income per capita, UAH	0,119	0,156	0,222	0,269	0,346	0,464	0,491	0,6	0,683
20	Average monthly nominal wage of employees, UAH	0,109	0,14	0,19	0,24	0,311	0,415	0,433	0,526	0,62
21	Characteristics of the regional human development	0,883	0,922	0,843	0,88	0,858	0,868	0,88	0,85	0,877
22	Ratio of minimum wage to the average wage, %	0,92	0,84	0,86	0,82	0,74	0,72	0,84	0,86	0,8
23	Total fertility rate (per 1000 of current population)	0,673	0,682	0,7	0,8	0,791	0,882	0,891	0,864	0,873
24	Share of realized innovative products in the total industrial, %	0,047	0,043	0,053	0,047	0,103	0,02	0,273	0,347	0,81
$I_{ji}$		0,63706	0,70377	0,71527	0,73213	0,75603	0,77279	0,78748	0,81259	0,83938

Source: own calculation.

Calculating the integrated indicator for the second method of calculating normalized values of indicators is performed using the formula:

$$I_{j2} = \sum a_{ij} z_{ij2}, \quad (2)$$

where  $z_{ij2}$  is the normalized values of the input indicators  $x_{ij}$  calculated with the second method.

The second method of calculation is performed using the formula

$$z_{ij2} = \begin{cases} \frac{x_{ij} - x_{zp}^n}{x_{nop}^n - x_{zp}^n}, & x_{zp}^n \leq x_{ij} < x_{nop}^n \\ \frac{(x_{ij} - x_{nop}^n) + x_n^* (x_{onm}^n - x_{ij})}{x_{onm}^n - x_{nop}^n}, & x_{nop}^n \leq x_{ij} < x_{onm}^n \\ 1, & x_{onm}^n \leq x_{ij} \leq x_{onm}^e \\ \frac{x_e^* (x_{ij} - x_{onm}^e) + (x_{nop}^e - x_{ij})}{x_{nop}^e - x_{onm}^e}, & x_{onm}^e < x_{ij} \leq x_{nop}^e \\ \frac{x_{zp}^e - x_{ij}}{x_{zp}^e - x_{nop}^e}, & x_{nop}^e < x_{ij} \leq x_{zp}^e \end{cases} \quad (3)$$

Table 3. Normalization of indicators and integrated indicators of social security in Poltava region calculation with the 2nd way

	Years						
	2005	2006	2007	2008	2009	2010	2011
1	0,06	0,08	0,62	0,88	0,72	0,545	0,92
2	0,965	0,99	1	1	1	1	1
3	0,395	0,520	0,670	0,825	0,735	0,700	0,800
4	0,744	0,698	0,663	0,709	0,663	0,802	0,744
5	0,06	0,08	0,62	0,88	0,72	0,545	0,92
20	0,698	0,951	1	1	1	0,949	0,760
21	0,56	0,78	0,65	0,71	0,78	0,6	0,76
22	1	1	0,85	0,800	1	1	1
23	1	0,6	0,65	0,65	0,6	0,75	0,7
24	0,65	0,6	1	0,2	1	1	0,535
integrated indicator	0,7458	0,7602	0,7868	0,7768	0,7956	0,7958	0,7997

Source: own calculation.

The calculation of integrated indicator for the second calculation method of normalized values of indicators separates the crisis year of 2008 better.

The next step is the determination of the generalized integrated indicator:

$$I_j = \frac{(I_{j1} + I_{j2})}{2}, \quad (4)$$

The calculation of the generalized integrated indicator of social security in Poltava region has shown its upward trend during 2005-2011. At the same time it was defined that the most significant indicator of negative affection on social security in 2011 have been a discrepancy between average wage and the subsistence level of able-bodied persons; unemployment rate in the Poltava region, which in 2011 was higher than a rate in Ukraine by 0.8%; ratio of minimum wage to average wage in 2011 has decreased by 2% in comparison with 2010; the significant proportion of the population with an average per month income below the subsistence minimum (28,8%).

Thus, on the second stage of this diagnostics method of social security condition in a region is performed the calculation and indicators analysis together with integrated indicator of social security.

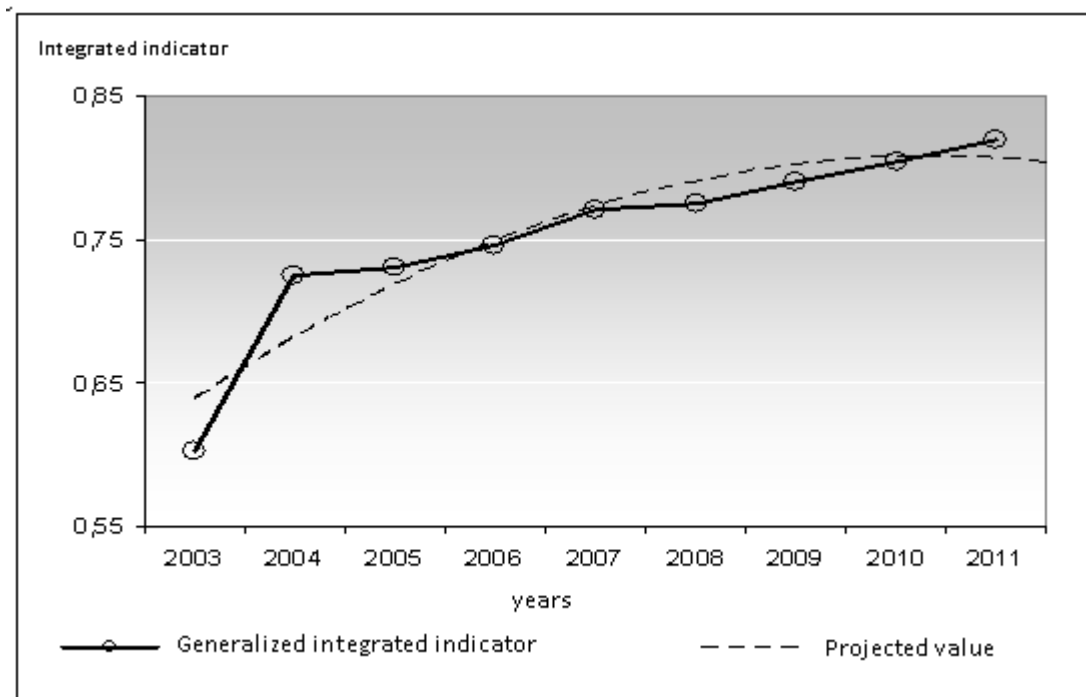


Fig. 5. The evolution of the generalized integrated indicator of social security in Poltava region during 2003-2011

The integrated indicator determination, analysis of its dynamics and social indicators components serves as an information base for establishment the vector of social security in a region implementation on the third stage of diagnostics.

The discrepancy of the most indicators of social security to their threshold values let us specify the priority directions for restructuring of social policy in 2012, at both levels the state and the region. A necessary condition for ensuring a high level of social security in the region is a reasonable implementation of regional social policy, key areas of which ought to be social protection, maintaining of effective employment; funding of the education sector, health level improvement, life quality improvement and preservation the gene pool, providing an environmentally safe living conditions of the population. On the third stage of diagnostics method of social security we monitor, develop and control programs implementation, specific activities aimed at reducing the impact of threats or neutralization in the context of providing social security.

## Conclusions

This way current diagnostics method of social security in the region is a methodological tool for measuring the effectiveness of social policy in the context of providing social security. The main components of the diagnostics algorithm of social security in the region are: the determination of social security indicators that influence its level and are subject to diagnosis, identification of diagnostics parameters and development of diagnostics methods, the definition and development of tools for diagnosis, development of diagnostics technologies and identification of the factors that affect the integrated indicator of social security in the region. This method will advantage the improvement of governance in the sphere of social policy to ensure social security in the region.

Given methodical approach to social security diagnosis in the region is oriented on crisis identifying in the process of socio-economy development. Its usage lets us define the

direction of region's social policy improvement. It as well takes into account potential and real threats.

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