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Current challenges and threats of regional development, the ways to overcome them**

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Abstract

The article is devoted to the study of challenges, the main threats to the development of regions and key ways to overcome them. The strengths and weaknesses, opportunities and threats of the regions have been studied with the help of SWOT-analysis. The interrelations of the regional development SWOT-matrix elements and variants of correlations among internal factors and external influences on the regions development have been determined. The use of graph-theoretic model for quantitative assessment of SWOT-matrix elements (strengths, weaknesses, opportunities, threats) has been proposed, as a result of which the priority opportunities have been identified, which implementation contributes to regional development: deepening integration with the EU, improving the business climate in Ukraine, stimulating the development of small and medium business.

Keywords: regional development; SWOT-analysis; theoretical-graph model; strengths; weaknesses; opportunities; threats.

1. Introduction

At the present stage of Ukraine development, differences in the level of regions competitiveness are deepening due to global challenges, risks and threats increasing that affect the country and its regions economy, in particular, the development of new generation technologies, social problems, etc. Therefore, there is a need for regional development socio-economic analysis, the comparative advantages, challenges and risks comprehensive analysis, considering their specifics to determine the needs of territories and ways to solve the problems.

2. Literature review

Numerous works of domestic scientists are devoted to the study of theoretical approaches to regional development, namely: V.Heetsya, Z.Herasymchuk, T.Zayats, I.Babets, D.Burkaltseva, N.Vavdiyuk, A.Humeniuk, M.Kyzyma, T.Klebanova, S.Stetsenko, A.Sukhorukova, V.Tkach, Y.Kharazishvili, V.Shlemko and others. However, their attention, in the vast majority, is focused on the theoretical aspects of regions sustainable development and the country socio-economic processes regulation.

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3. The identification of previously unresolved issues and the formulation of research hypotheses

In order to identify strengths and weaknesses, opportunities and threats to regions socio-economic development, regional development strategies of Zhytomyr, Ivano-Frankivsk, Mykolaiv, Poltava, Sumy regions, which are close to the main criteria (total area, population, gross regional product, the industrial and agricultural potential level, the export-import operations volume, the amount of annual income per 1 person). It enables to consider the heterogeneity of regions socio-economic development in the regional comparisons implementation. The economic system development SWOT analysis has been carried out in order to identify strengths and weaknesses, opportunities and threats (table 1).

Table 1
SWOT-analysis of the analyzed regions economic system

Strengths	**Weakness**
1. Favorable geographical location; 2. Significant transit potential, developed network of transport infrastructure; 3. The presence of a large number of productive agricultural lands; 4. Favorable natural and climatic conditions for agriculture; 5. Diversified agriculture; 6. Availability of raw materials for further processing of agricultural products; 7. Highly developed food industry with well-known brands; 8. Availability of significant mineral deposits, renewable and alternative energy sources, forest resources; 9. Developed industrial potential (engineering, chemical, oil and gas, mining, food, woodworking, production of building materials); 10. Low level of ecological load; 11. Powerful natural and recreational potential, high reserves of quality groundwater, including mineral; 12. Significant historical and cultural potential (presence of objects of architectural, historical and cultural heritage, presence of local cultural and artistic brands); 13. Developed network of educational institutions and research institutions. High level of education of the population; 14. Skilled labor resources	1. Depreciation of existing infrastructure, especially in housing and communal services and roads; 2. High level of physical depreciation of fixed assets in the real sector of the economy; 3. High level of energy and resource intensity of production, high dependence on gas; 4. Industry technological backwardness; 5. Low innovative activity of enterprises, weak links with research institutions; 6. Insufficient diversification of industry and markets; 7. Excessive export orientation to the markets of the Customs Union countries, including Russia; 8. Lack of regulation and control over the introduction of chemicals into soils and crop rotations, which leads to land degradation; 9. Non-compliance of certain types of agricultural products with EU standards; 10. Unsatisfactory condition of roads, especially in rural areas; 11. Interregional disparities in socio-economic development; 12. Low level of use of alternative and renewable energy sources, introduction of energy efficient technologies; 13. Absence of enterprises for processing and utilization of industrial and solid household waste; 14. Difficult demographic situation; 15. High unemployment, especially in rural areas and among young people; 16. High labor migration of the population, including outflow of intellectual resources, youth; 17. Non-compliance of workers' qualifications with market requirements
Opportunities	**Threats**
1. Deepening integration with the EU (emergence of new markets, export growth); 2. Carrying out administrative reform, decentralization of power, increasing the financial independence of communities; 3. Growing demand for food on the world market, including for fresh organic products; 4. Popularization of ecological way of life, ecological products consumption, development of organic agriculture; 5. Improving the business climate in Ukraine, stimulating the development of small and medium-sized businesses; 6. Creating a favorable investment climate, including by attracting foreign foreign investment;	1. Political instability, continuation of the anti-terrorist operation in eastern Ukraine; 2. Deepening economic crisis in Ukraine; 3. Slow implementation of administrative reform, decentralization of power; 4. Weakening of foreign economic relations with the countries of the Customs Union, reduction of investments; 5. Deterioration of competitiveness of Ukrainian goods due to growing volumes of imported goods from EU countries; 6. Monopoly of energy supply structures, rising energy prices; 7. High dependence on imported natural gas; 8. National currency instability, inflation continuation;

End of the table 1

Opportunities	Threats
7. Introduction of international practice achievements of innovations and technologies; 8. Improving the scientific potential efficiency; 9. The IT industry development; 10. Industrial parks creation; 11. Creation of waste processing facilities; 12. Energy efficiency stimulation (in production, housing and communal services, social sphere); 13. Alternative energy development; 14. Increasing the transit potential, increasing the volume of passenger and freight traffic; 15. Infrastructure development, including road and housing and communal; 16. Development of tourism, including ecotourism (domestic and international); 17. Reducing corruption	9. Decrease in domestic trade due to low purchasing power of the population; 10. Strengthening the stratification of the population in terms of material well-being; 11. Labor migration growth; 12. Accelerated depopulation of the population, especially in rural areas

Based on it, to determine the competitive advantages, challenges, security and risks of regions, it is proposed to use SWOT-analysis tools which enables to build a SWOT-matrix and determine the content of links between their elements.

4. Research methodology and methods

The purpose of this publication is to identify the regions priority opportunities which implementation contributes to the regional system development. The implementation of opportunities provides support and helps to solve the problems associated with the presence of weaknesses: strengths can eliminate the threats that affect the system weaknesses (fig. 1).

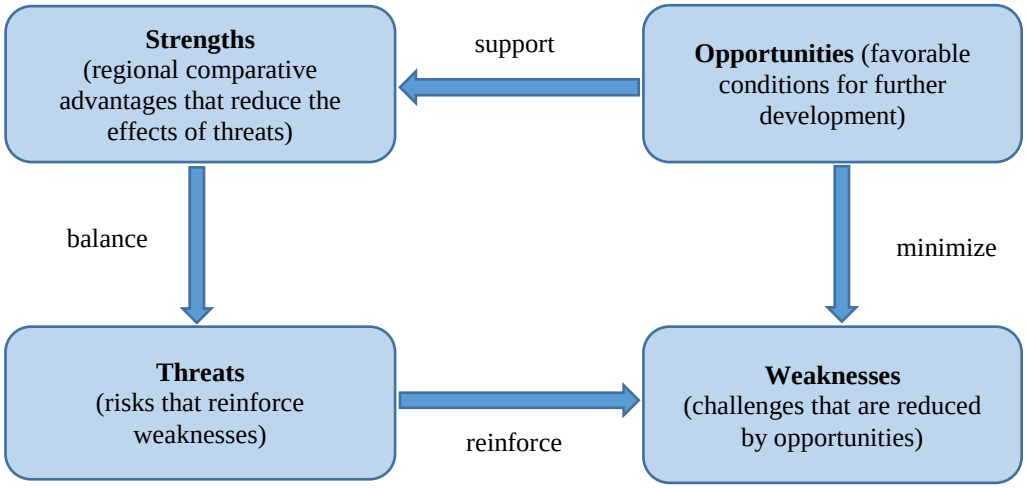

Fig. 1. Relationships of the regional development SWOT-matrix elements

Variants of correlations between internal factors and external influences enable to define further strategy of actions for realization of opportunities in use of strong parties and reduction of influence risks on weak sides. In order to implement the next stage of modeling the interaction among the elements of the SWOT-matrix, quantifying the impact of some of its elements on others and identifying priority opportunities, which implementation contributes to the regional system development, it is proposed to use a graph model. It is constructed a graph G, the vertices of which correspond to the elements of the SWOT-matrix. The set of vertices of this graph has the form

$$G^0 = \{\alpha_i\}_{i=1}^{17} \cup \{\beta_j\}_{j=1}^{14} \cup \{\gamma_k\}_{k=1}^{12} \cup \{\delta_l\}_{l=1}^{17} \quad (1)$$

where α_i – vertices corresponding to the possibilities; β_j – vertices that correspond to the strengths; γ_k – vertices corresponding to threats; δ_l – vertices that correspond to the weaknesses.

The approximate edges of the graph G correspond to the connections between the elements of the SWOT-matrix. These ribs are divided into several types. Ribs ($\alpha_i\beta_j$) correspond to the relationship between opportunities and strengths and determine which strengths have the most support through the realization of opportunities. Each edge ($\alpha_i\beta_j$) corresponds to its weight f ($\alpha_i\beta_j$), which determines the strength of the corresponding bond. Weight values belong to the set {1; 0,75; 0,5; 0,25}. The presence of such edges and their weight is determined by the matrix M (α, β), the elements of which are f ($\alpha_i\beta_j$). The subgraph $G\alpha\beta$ of the graph G on the set of vertices corresponding to the capabilities and strengths is shown in figure 2.

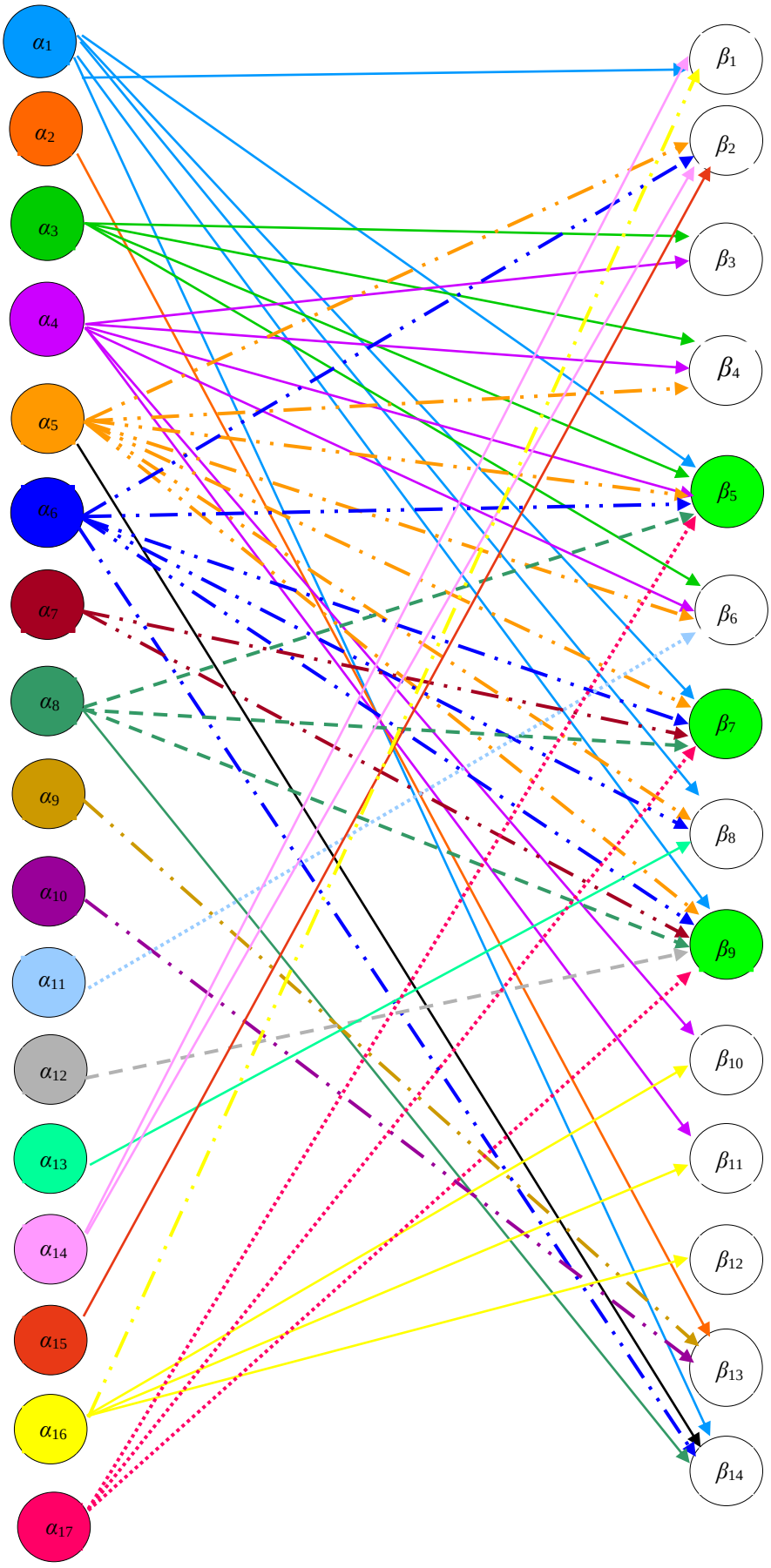

Fig. 2. Subgraph *Gαβ*, which reflects the impact of opportunities on strengths

5. Main results

Given the limited financial resources, it is necessary to prioritize the allocation of resources and focus on those strengths that can provide the highest results in the shortest possible time and have a long-term and comprehensive impact on the development of not only this area but also neighboring regions.

Due to constructing a subgraph of $G\alpha\beta$ links between strengths and opportunities, it is established that to increase the level of economic development of selected regions, the greatest support through the implementation of favorable opportunities should be given to the following strengths: development of diversified agriculture, developed industrial potential, highly developed food industry brands. It is facilitated by the following opportunities: Ukraine integration into the European space, growing demand for food on the world market, including for organic products; improving the business climate in Ukraine and stimulating the development of small and medium-sized businesses, creating a favorable investment climate, including by attracting foreign investment; increasing the scientific potential efficiency; reducing corruption.

The edges $(\beta_j\ \gamma_k)$ correspond to the links between strengths and threats and identify strengths that mitigate threats. Each edge $(\beta_j\ \gamma_k)$ corresponds to its weight $f\ (\beta_j\ \gamma_k)$, which determines the strength of the corresponding bond. Weight values belong to the set {1; 0,75; 0,5; 0,25}. The presence of such edges and their weight is determined by the matrix $M\ (\beta, \gamma)$, the elements of which are $f\ (\beta_j\ \gamma_k)$. The subgraph $G\beta\gamma$ of the graph G on the set of vertices corresponding to the strengths and threats is shown in figure 3.

As a result of the subgraph $G\beta\gamma$, it has been revealed that strengthening the strengths of the economic system of the analyzed regions neutralize the following threats: deepening economic crisis in Ukraine, weakening foreign economic relations with the Customs Union, reducing investment, deteriorating competitiveness of Ukrainian goods due to growing imports, instability of the national currency exchange rate, preservation of inflationary influences, strengthening of the population stratification by the level of material well-being. Among the main strengths that compensate for the effects of threats are: the diversified agriculture development, developed industrial potential, the availability of raw materials for further processing of agricultural products, highly developed food industry with well-known brands, the presence of significant mineral deposits, renewable and alternative energy resources.

Ribs $(\gamma_k\ \delta_l)$ correspond to the links between threats and weaknesses and identify the weakest points (internal factors) of the subject of analysis under the influence of negative external factors – threats, i.e. the most likely risks in the further implementation of regional development plans which should be avoided or whose impact should be minimized through the choice of strategic decisions). Each edge $(\gamma_k\ \delta_l)$ corresponds to its weight $f\ (\gamma_k\ \delta_l)$, which determines the corresponding bond strength. Weight values belong to the set {1; 0,75; 0,5; 0,25}. The presence of such edges and their weight are determined by the matrix $M\ (\gamma, \delta)$, the elements of which are $f\ (\gamma_k\ \delta_l)$. The subgraph $G\gamma\delta$ of the graph G on the set of vertices corresponding to threats and weaknesses is shown in figure 4.

Subgraph $G\gamma\delta$ identified the weakest aspects of the regions` economic system under the influence of negative external factors (with a high probability of their development into threats), including: high labor migration (including outflow of intellectual resources, youth), interregional disparities in socio-economic development, difficult demographic situation, high unemployment, especially in rural areas and among young people.

The main threats to the weaknesses are political instability, the continuation of the Joint Forces Operation in eastern Ukraine, the deepening economic crisis in Ukraine, population accelerated depopulation (especially in rural areas), labor migration growth, and material well-being the intensification.

The edges $(\alpha_i\delta_l)$ correspond to the connections between opportunities and weaknesses and identify weaknesses that can be eliminated through opportunities. Each edge $(\alpha_i\delta_l)$ corresponds to its weight $f\ (\alpha_i\delta_l)$, which determines the strength of the corresponding bond. Weight values belong to the set {1; 0,75; 0,5; 0,25}. The presence of such edges and their weight are determined by the matrix $M\ (\alpha, \delta)$, the elements of which are $f\ (\alpha_i\delta_l)$. The subgraph $G\alpha\delta$ of the graph G on the set of vertices corresponding to the capabilities and weaknesses is shown in figure 5.

The constructed subgraph $G\alpha\delta$ enables to establish opportunities that have a positive effect on weaknesses. Due to the implementation of opportunities, the following weaknesses can be minimized: technological backwardness of industry, low innovation activity of enterprises and weak links with research institutions, high unemployment (including in rural areas and among young people), inconsistency of certain types of agricultural products EU standards. Opportunities that reduce the vulnerability of the region's economic system are deepening integration with the EU, improving the business climate in Ukraine, stimulating the development of small and medium-sized businesses, creating a favorable investment climate, including by attracting foreign investment, introduction of international practice achievements in innovation and technology, IT industry development, industrial parks creation.

Thus, due to the implementation of opportunities, the following weaknesses of regional development can be minimized: industry technological backwardness, low innovation activity of enterprises and weak links with research institutions, high unemployment (including in rural areas and among young people), non-compliance of certain types of agricultural products with EU standards.

Let us include in the set of edges of the graph G the edges $(\alpha_i\gamma_k)$ that correspond to the connections between opportunities and threats. The strength of the corresponding connections is determined by the weights $f\ (\alpha_i\gamma_k)$, which are calculated on the basis of this graph-based model. Suppose that there exist edges $(\alpha_i\beta_j)$ in the graph $G\ (\beta_j\gamma_k)$. This means that the realization of the possibility that corresponds to the vertex α_i reinforces the strength that corresponds to the vertex β_j, which in turn helps to overcome the threat that corresponds to the vertex γ_k. The impact of the i-th opportunity to overcome the k-th threat based on

the strengthening of the *j*-th strength is estimated by the value of $f(\alpha_i\beta_j)\, f(\beta_j\gamma_k)$, and the total impact of the corresponding opportunity to overcome this threat is determined by the equality:

$$f(\alpha_i\gamma_k) = \sum_{j=1}^{14} f(\alpha_i\beta_j)\, f(\beta_j\gamma_k)\cdot \quad (2)$$

It means that there is equality

$$M(\alpha, \gamma) = M(\alpha, \beta)\, M(\beta, \gamma), \quad (3)$$

where $M(\alpha, \gamma)$ – a matrix which elements are $f(\alpha_i\gamma_k)$.

Let us include in the set of edges of the graph *G* the edges $(\alpha_i\delta_l)$, which correspond to the connections between opportunities and weaknesses. The strength of the corresponding connections is determined by the weighting factors $f(\alpha_i\delta_l)$, which are calculated on this theoretical-graph model basis. Suppose that there exist edges $(\alpha_i\gamma_k)$ and $(\gamma_k\delta_l)$ in the graph *G*. This means that the realization of the possibility corresponding to the vertex α_i helps to overcome the threat that corresponds to the vertex γ_k, which in turn helps to overcome the threat, which affects the weak side that corresponds to the vertex δ_l. The impact of the *i*-th possibility on the *l*-th weakness based on overcoming the *k*-th threat is estimated by the value of $f(\alpha_i\gamma_k)\, f(\gamma_k\delta_l)$, which is determined by the equality

$$f(\alpha_i\delta_l) = \sum_{j=1}^{12} f(\alpha_i\gamma_k)\, f(\gamma_k\delta_l) \quad (4)$$

It means that there is equality

$$M'(\alpha, \delta) = M(\alpha, \gamma)\, M(\gamma, \delta), \quad (5)$$

where $M'(\alpha, \delta)$ – a matrix which elements are $f(\alpha_i\delta_l)$.

The overall impact of opportunities on weaknesses is reflected by the matrix $M(\alpha, \delta) + M'(\alpha, \delta)$. The subgraph $M\,\alpha, \delta$, which reflects the overall impact of opportunities on the weaknesses, is shown in figure 6.

Modeling general results of the region economic system elements relationships are shown in table 2.

Table 2

The result of modeling the relationships of the region economic system elements

Subgraph	**Influence of elements**	**The result of impact modeling**
		Influence of elements
Gαβ (opportunities-strengths)	support for strengths through the realization of opportunities	diversified agriculture
		developed industrial potential
		highly developed food industry with well-known brands
Gβγ (strengths and threats)	threats neutralized by the action of strengths	deepening economic crisis in Ukraine
		weakening foreign economic relations with the countries of the Customs Union
		reduction of investments
		deterioration of the competitiveness of Ukrainian goods due to the growth of imported goods from EU countries
		instability of the national currency
		continuation of inflationary processes
		strengthening the stratification of the population in terms of material well-being
Gγδ (threats and weaknesses)	weaknesses that are exacerbated by threats	high labor migration of the population (including the outflow of intellectual resources, youth
		interregional disparities in socio-economic development
		difficult demographic situation
		high unemployment, especially in rural areas and among young people
Gαδ (opportunities and weaknesses)	weaknesses of the regions, which are minimized through the realization of opportunities	technological backwardness of industry
		low innovative activity of enterprises and weak links with research institutions
		high unemployment (including in rural areas and among young people)
		non-compliance of certain types of agricultural products with EU standards
M α, δ (opportunities and weaknesses)	opportunities that have the greatest impact on overcoming weaknesses	deepening integration with the EU
		improving the business climate in Ukraine,
		stimulating the development of small and medium business

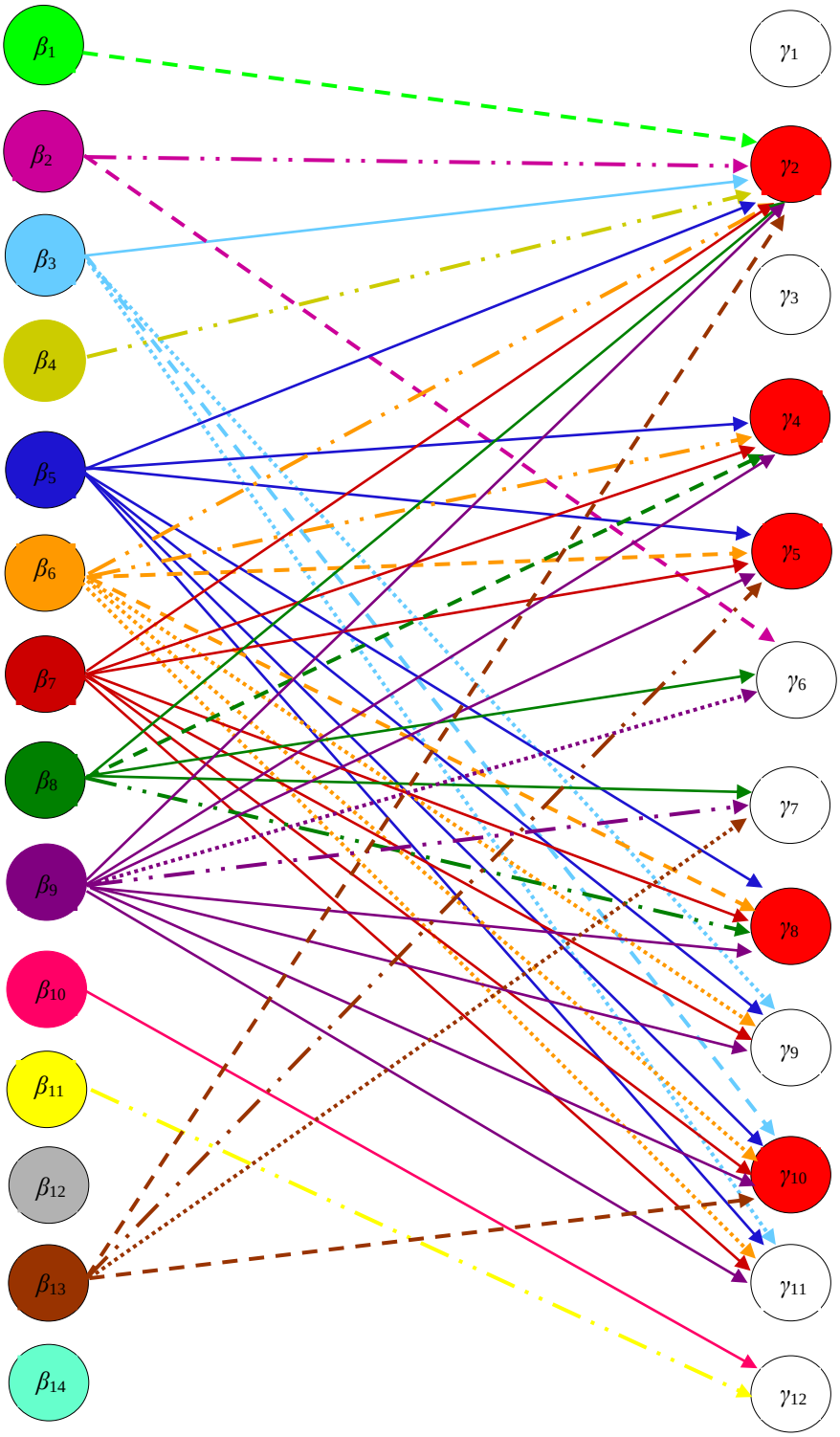

Fig. 3. Subgraph $G\beta\gamma$, which reflects the influence of strengths on threats

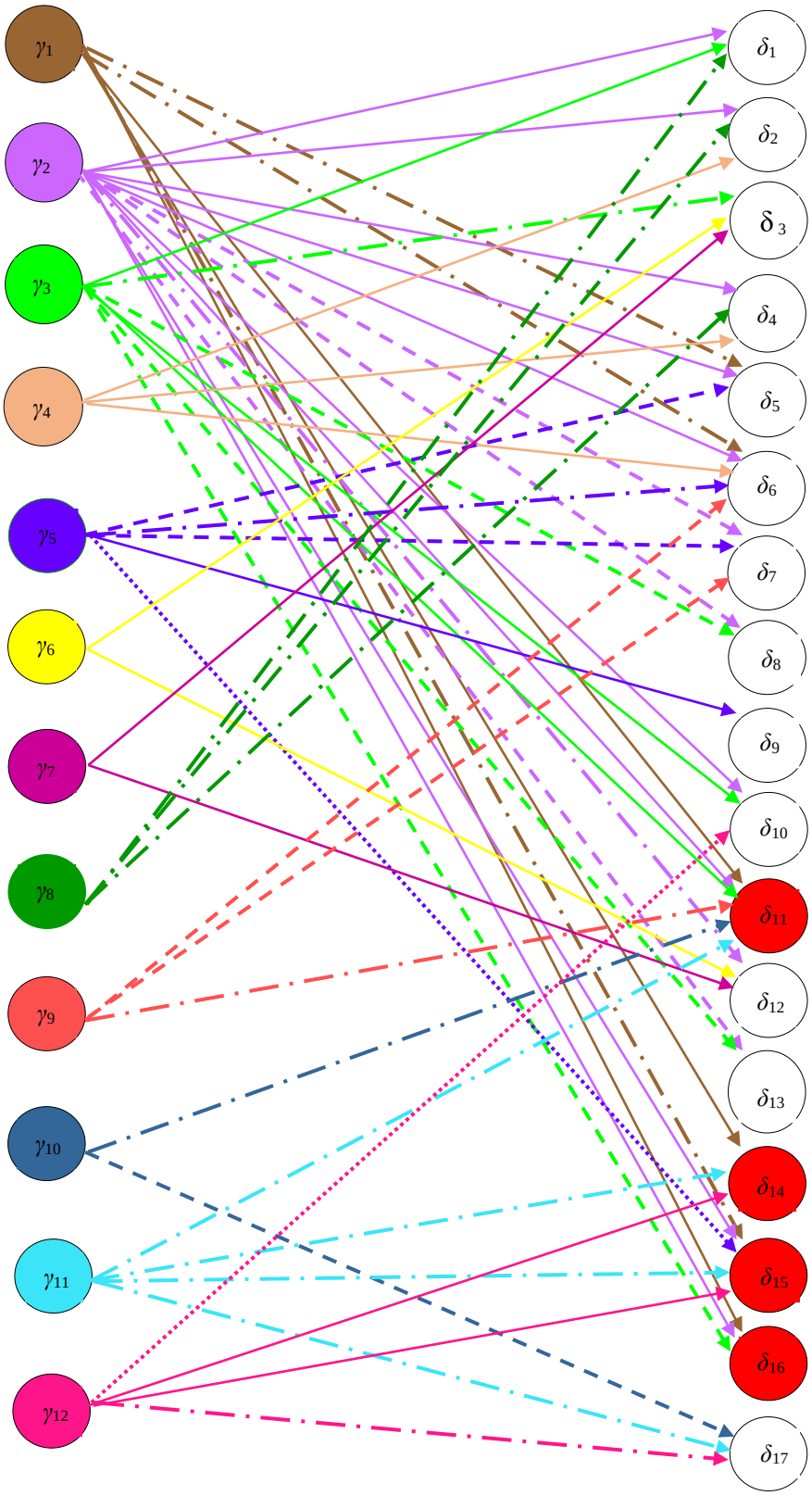

Fig. 4. Subgraph $G\gamma\delta$, which reflects the impact of threats on weaknesses

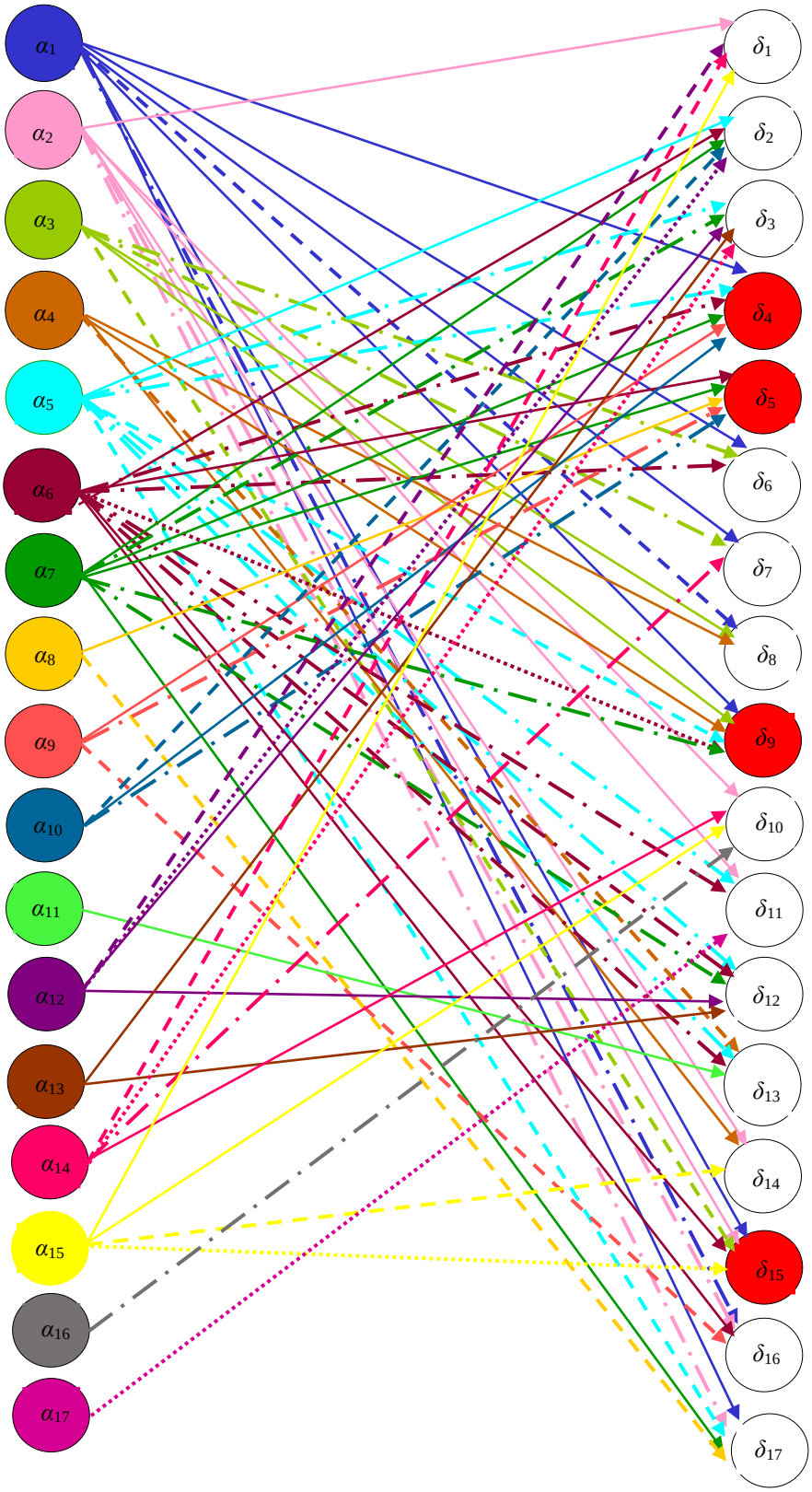

Fig. 5. Subgraph *Gαδ*, which reflects the impact of opportunities on weaknesses

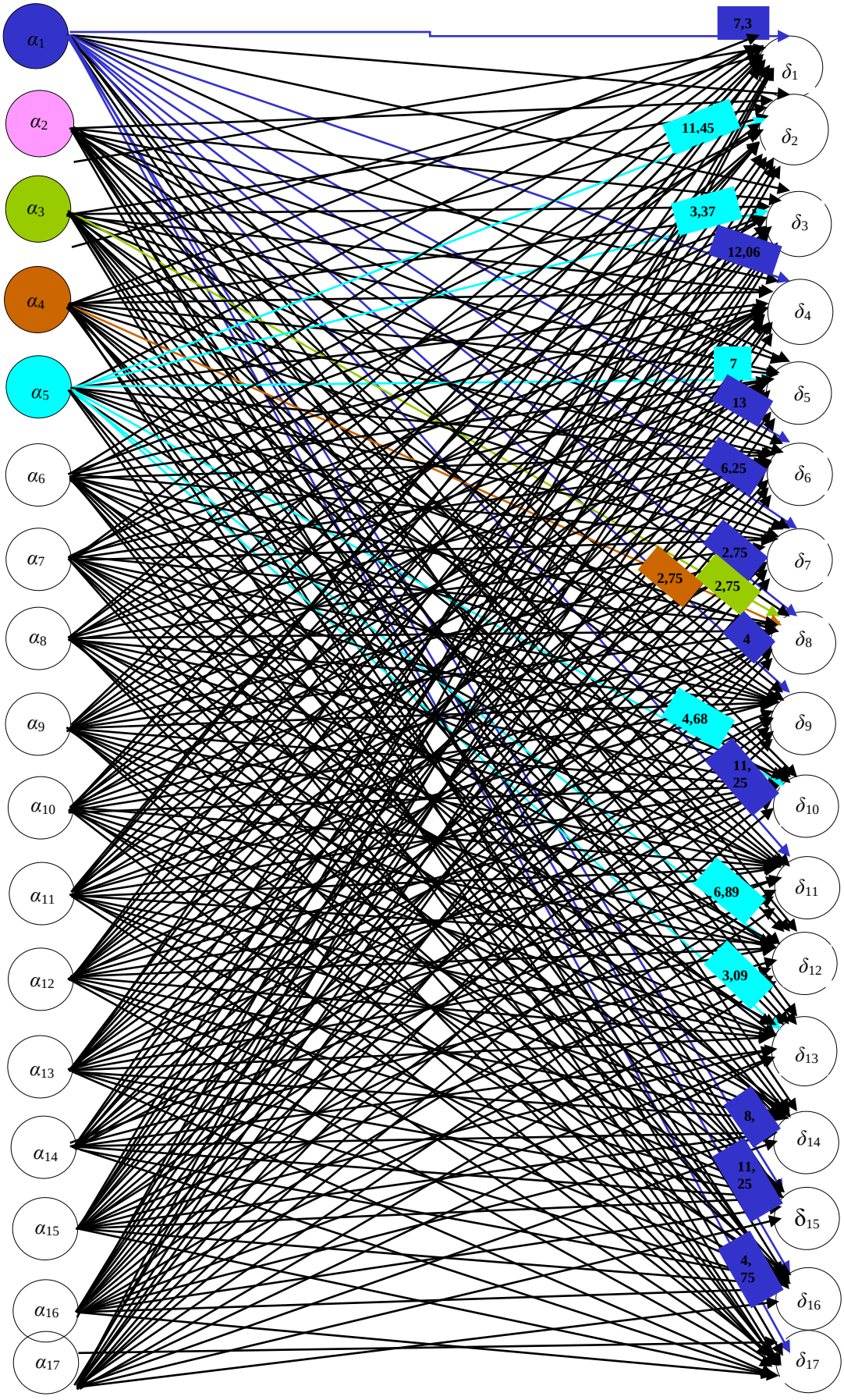

Fig. 6. Subgraph $M\,\alpha, \delta$, which reflects the impact of opportunities on weaknesses

6. Concluding remarks

Based on the results of modeling and quantitative assessment of the system elements impacts, priority opportunities have been identified, the implementation of which contribute to regional development: deepening integration with the EU, improving the business climate in Ukraine, stimulating small and medium business development.

The advantages of the proposed approach include the fact that it reduces the consequences of subjective assessment of socio-economic development of regions, risks and threats that affect the dynamics of socio-economic processes, determine the level of their economic security in general and the proposed components.

Practical application of the obtained results – the developed methodological approach can be used to substantiate the state priorities of regional development of similar regions (selected on the basis of cluster method and enables to determine the main directions of their development management at the state level): development priorities of specific regions and their development strategies formation or adjustment.

Areas of further research in this area are related to the development of an effective program to ensure the regional development security.

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