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SCENARIO FORECAST OF THE REGION'S CROSS BORDER COORDINATED DEVELOPMENT ON THE EXAMPLE OF ROMANIA AND CHERNIVTSI REGION

СЦЕНАРНИЙ ПРОГНОЗ ТРАНСКОРДОННО-УЗГОДЖЕНОГО РОЗВИТКУ РЕГІОНУ НА ПРИКЛАДІ РУМУНІЇ ТА ЧЕРНІВЕЦЬКОЇ ОБЛАСТІ

ANNOTATION
In the article with the help of group method of data handling we have conducted the analysis of social and economic statistic data of Chernivtsi region and Romania on the period of 2005–2015 and there have been highlighted the main factors of their coordinated development. Scenario analysis of the factors under investigation influence on Chernivtsi region confirmed the possibility of its GRP increase and improvement of other social and economic regional development indices on the period of 2016–2020. The results show that the aims of coordinated development do not lead to Pareto negative tendencies. Moreover, their presence in the development strategy of Chernivtsi region stimulates the synergic effects in the region's subsystems.
Keywords: group method of data handling, scenario forecast, cross border coordinated development strategies.

АНОТАЦІЯ
У статті методом групового урахування аргументів здійснено аналіз соціально-економічних статистичних даних Чернівецької області та Румунії за 2005–2015 рр., а також виявлено головні чинники їх узгодженого розвитку. Сценарний аналіз впливу цих чинників на Чернівецьку область підтвердив можливість зростання її ВРП та покращення більшості інших соціально-економічних показників регіонального розвитку на 2016–2020 рр. Отримані результати виявили, що цілі узгодженого розвитку не приводять до прояву негативних тенденцій Паретто. Більше того, їх закладання в стратегію розвитку Чернівецької області стимулює прояв синергійних ефектів в підсистемах регіону.
Ключові слова: метод групового урахування аргументів, сценарне прогнозування, транскордонно-узгоджені стратегії розвитку.

АННОТАЦИЯ
В статье методом группового учета аргументов осуществлен анализ социально-экономических статистических данных Черновицкой области и Румынии за 2005–2015 гг., а также определены основные факторы их согласованного развития. Сценарный анализ влияния данных факторов на Черновицкую область подтвердил возможность роста ее ВРП и улучшения большинства других социально-экономических показателей регионального развития на 2016–2020 гг. Полученные результаты определили, что цели согласованного развития не приводят к проявлению негативных тенденций Парето. Более того, их внедрение в стратегию развития Черновицкой области стимулирует проявление синергических эффектов в подсистемах региона.
Ключевые слова: метод группового учета аргументов, сценарное прогнозирование, трансгранично-согласованные стратегии развития.

Formulation of the problem. Social and economic development of a country is impossible without scientifically based modernization of its social, economic, resource and ecological processes, first of all on the regional level.

Though, regional development is a complicated process that is conditioned by the correlation of different spheres: economic, social, political, law, ecological etc. Elaboration of effective management mechanisms is complicated by the unique nature of each region and is impossible without investigating the local economic objects functioning, resource base, historical originality, social relationships, self-government traditions, political conjuncture and borders with other regions, especially with well-developed countries.

Integration tendencies of our country as to becoming a member of EU make preconditions of transformation bordering regions into attractive centers of national development. That's why management theorists and practical workers should work out new approaches and mechanisms of the strategic development of the regions bordering with EU countries. The crucial role here should belong to the search of long term development scenarios that are mutually beneficial both to the frontier region and its European neighbor.

Analysis of recent research and publications. Nowadays the question of regional development scenario forecast is very important for scientists and administration. The main tendencies of investigations in the given aspect are the working out of scenarios on the basis of economic and mathematic models of regional processes [1], cognitive analysis [2], imitative modeling [3] etc.

Despite of the essential scientific works in methods and methodology of the regional systems scenario analysis, the question of scenario forecast, when coordinating frontier regions development, is still open. Thus, main achievements here belong to investigating branch problems of scenario analysis [4] or to the search of universal development parameters of frontier regional systems [5]. Though, the main peculiarities of social and economic development scenario forecast, in particular when we talk about frontier regions, still need specification.

The solution of unsolved aspects of the problem. Subjects of the region's strategic administration need, for sure, optimistic and pessimistic prognoses of its development. But today we don't have a unique optimal and adequate model for making such prognoses on the basis of using the

data from modern national and World Statistics. The situation becomes more complicated when we need to ascertain the factors of frontier regions coordinated development.

Purpose of the article is elaboration and approbation of the cross-border coordinated scenario forecast of the region's development. As the object of the study we have chosen Chernivtsi region and Romania.

Statement of the main material of the study. The main aims of the cross border coordinated strategy are the chosen parameters of Chernivtsi region and Romania social and economic systems functioning, the leading role on which provides optimistic development for a long term perspective.

The list of such parameters and the forecast of their influence is suggested to be defined within the limits of the 4 consecutive stages of the scenario analysis.

1st stage. Selection of the main statistic indices, that outline the essential aspects of frontier neighbors social and economic systems functioning (Romania and Chernivtsi region).

In the case of Romania we see three indices of the World Bank macro statistics on the period of 2005-2015, that display partially the peculiarities of frontier interaction:

– GDP per capita, USD – here they are denoted by symbols RO1;
– Export in % according to GDP – RO2;
– Import in % according to GDP – RO3.

In the case of Chernivtsi region – we have the indices given by the State Statistics Service on the same period of time:

– GRP per capita, UAH – CV1;
– Export, mln. USD – CV2;
– Direct investments, mln. USD – CV3;
– Transportation of goods by road, ths. tons – CV4;

– Passenger transportation by road, ths. pas. – CV5.

2nd stage. Building the inertial pessimistic scenario of the GRP social and economic development.

The main integral criterion of the region's social and economic development today remains the GRP. To calculate the scenario's dynamics we have applied the group method of data handling (GMDH) realized in the GMDH Shell DS environment. As the influence basis on the prognosis indices we have chosen the GRP dynamics in Chernivtsi region on the period of the last 10 years (2005–2015).

With high precision of the determination coefficient (R^2) 0,83 we have defined that Chernivtsi region GRP development dynamics on the period of 2016-2020 will correspond the dependence:

$$CV1(t) = -2255,09 + 838,776 \cdot \sqrt[3]{CV1(t-5)} . \quad (1)$$

So we have proven that the potential of present development strategies of Chernivtsi region are exhausted (See Part 2017-2020. Pic. 1). There exists a keen need of new strategic orientation points search, in particular of cross border content.

3rd stage. Construction of multi factor model of Chernivtsi region development.

When stating the aims of main agreed factors of Chernivtsi region development the use of mathematic functional is of no alternative:

$$CV1 = f(CV2, CV3, CV4, CV5, RO1, RO2, RO3) . \quad (2)$$

The applied use of the dependence provides the possibility to make the proper development scenarios and finding out its most significant factors.

To formalize the functional (2) we have taken the analysis of the stated statistic indices GMDH on the period of 2005-2015. With the high determination coefficient precision (R2) 0,98 the anal-
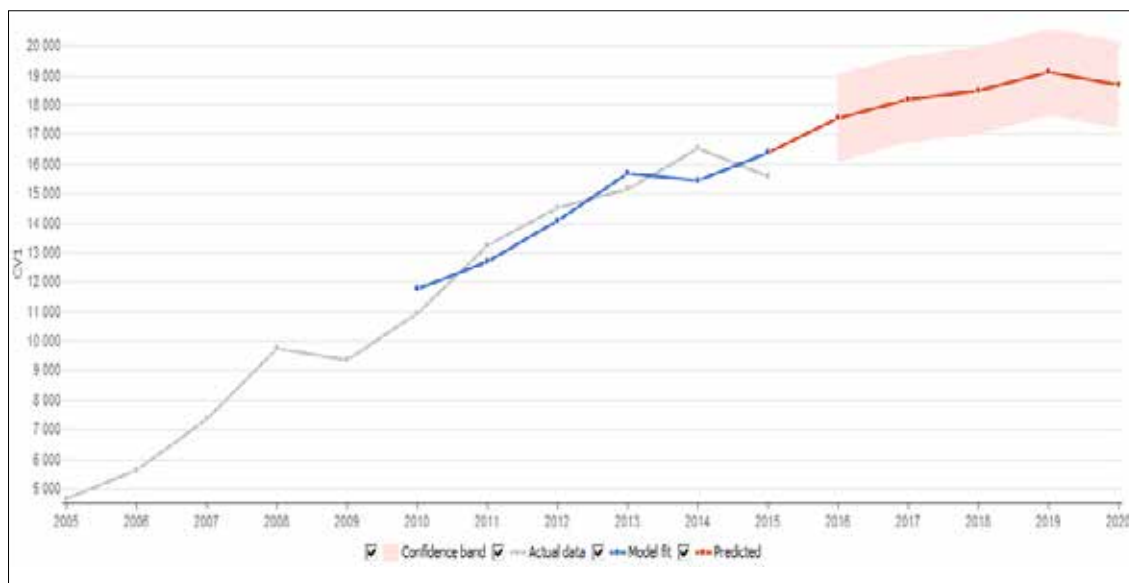

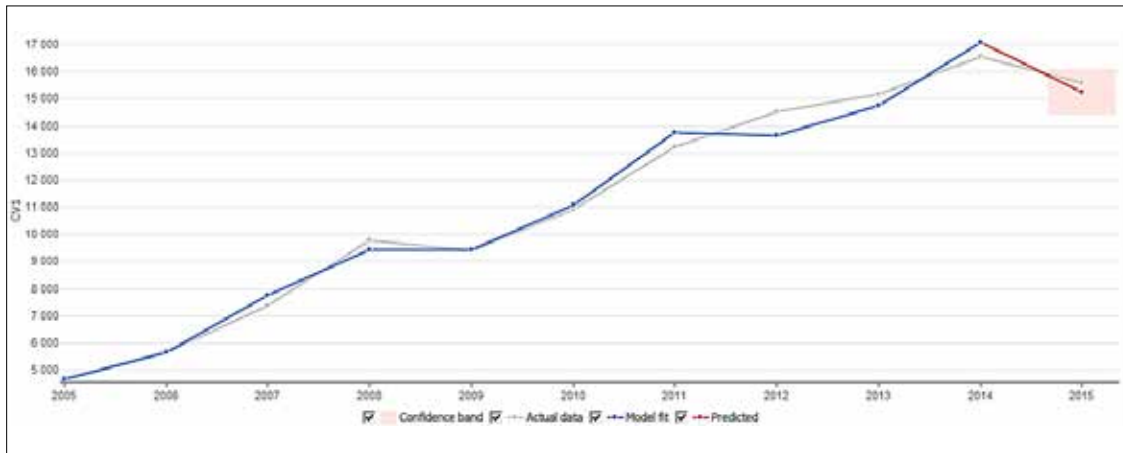Fig. 1. Inertial pessimistic development scenario of Chernivtsi region on the period up to 2020

Fig. 2. Graphic representation of the functional descriptive adequacy (3)
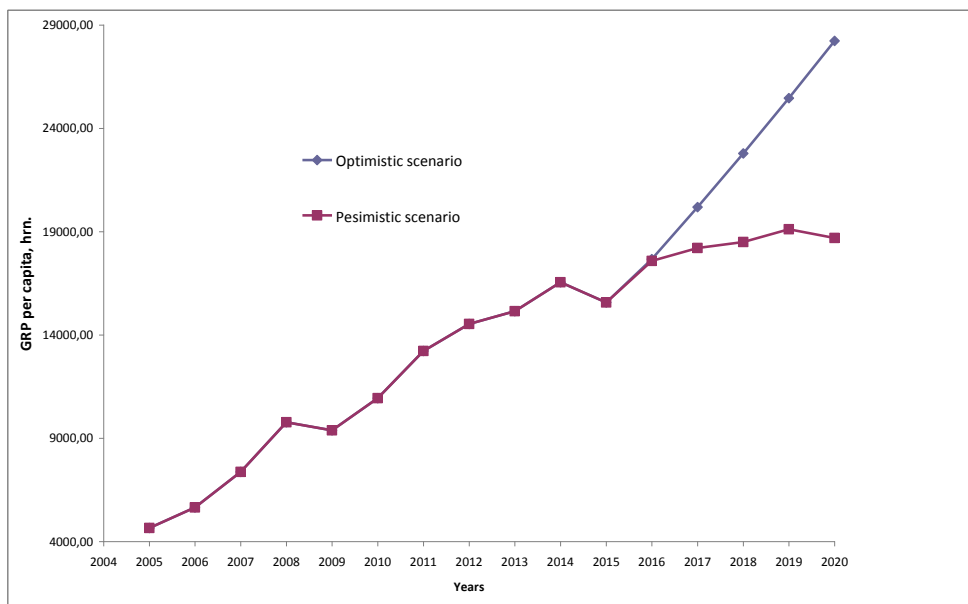

Fig. 3. GRP development scenario in Chernivtsi region
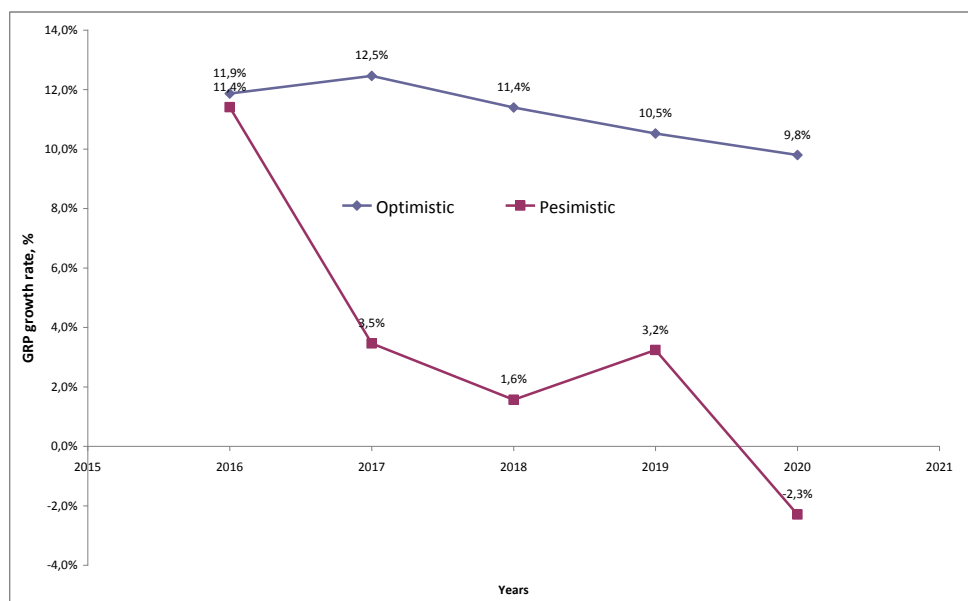

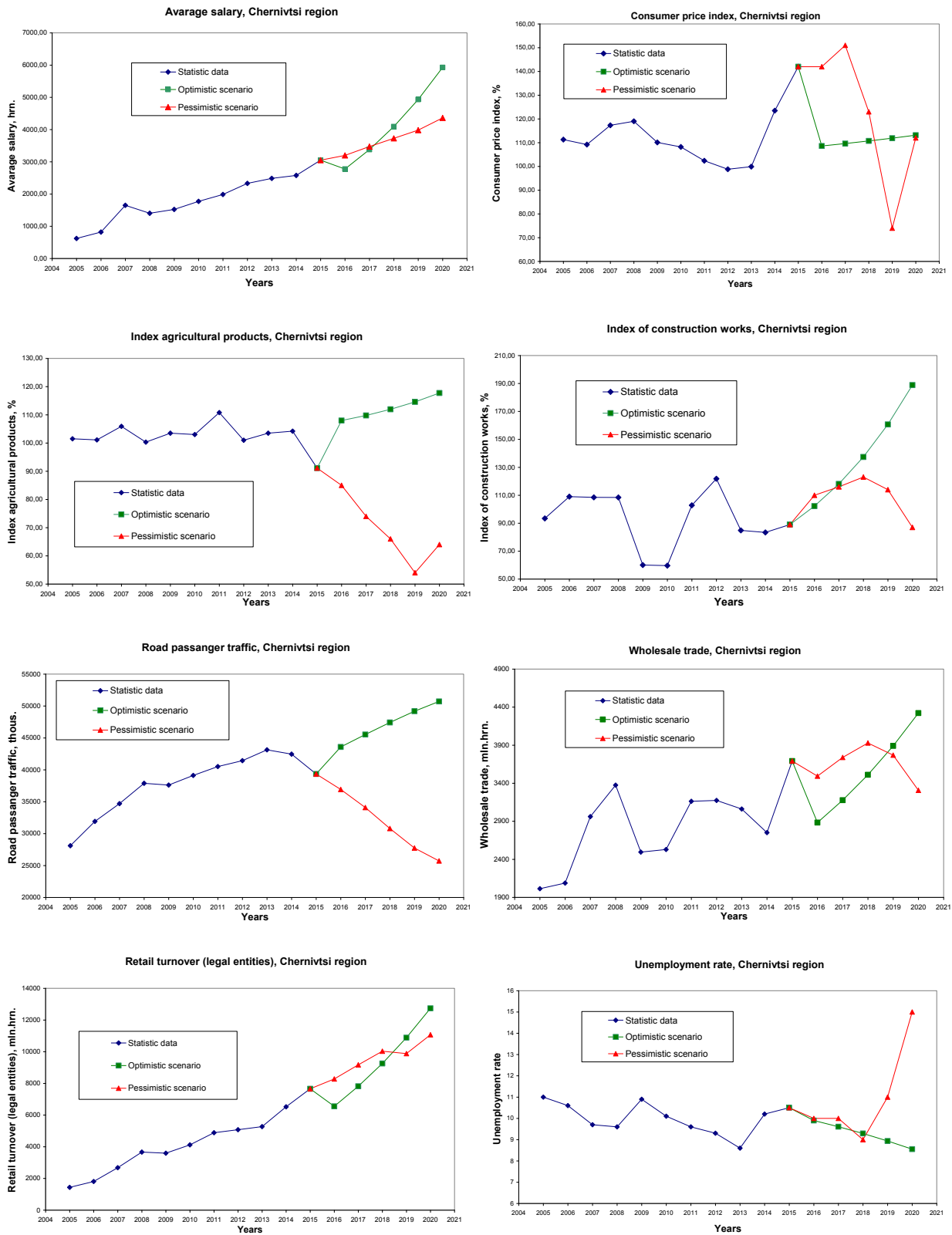**Fig. 4. GRP growth rate scenarios in Chernivtsi region**

Fig. 5. Cross border coordinated development scenarios of Chernivtsi region (up to 2020)

ysis results are displayed with the help of a polynomial and its graphic representation (fig. 2):

$$CV1 = -60249,6 + 11047,4 \cdot \sqrt[3]{RO2} +$$
$$+ 2635,69 \cdot \sqrt[3]{CV2} + 5875,72 \cdot \sqrt[3]{CV3} \quad . \quad (3)$$

Other functional parameters (3) GMDH are declined as ineffective. Thus the economic and mathematic model of the coordinated development shows the availability of three influential factors on the Chernivtsi region GRP:

− Romanian export processes intensity (RO2);
− Chernivtsi region export processes intensity (CV2);
− Chernivtsi region direct investment operations intensity (CV3).

The leading administrative influence on these parameters with providing their nominal 10% increase (as assumption) foresees the extreme limits of the optimistic development scenario of Chernivtsi region (fig. 3).

Moreover, the nominal 10% (0,1) rate increase of the influence factors growth leads to the excelling in the region's development rate increase to more than 10% (fig. 4).

The results show that the offered aims of development do not lead to the negative Pareto tendencies. Moreover, putting the mentioned aims into the development strategy stimulates the synergic effects display in regional subsystems of the region.

4th stage. Forecast the development scenarios of main social and economic indices in Chernivtsi region.

Forecast of main development indices of the region on the period 2016−2020 was conducted within the GMDH that allows stating the dependence of the chosen index from the leading parameters: intensity of Romanian export; intensity of Chernivtsi region's export; intensity of direct investment operations of Chernivtsi region.

For building pessimistic scenarios we have used inertial index dependencies. For building an optimistic one − we have taken into consideration the increase of the leading factors with yearly rate 0,1.

The final results of the forecast are shown on fig. 5.

Conclusions. Within the analysis limits of the group method of data handling investigating the development of Chernivtsi region and Romania on the period of 2005−2015 there was found out main factors of their coordinated development. Scenario analysis of the given factors influence on Chernivtsi region development confirmed the possibility of GRP increase and improvement of other regional development indices on the period 2016−2020: average salary, indices of agricultural products and construction works, passenger traffic, etc.

The results show that the aims of coordinated development do not lead to Pareto negative tendencies. Moreover, their presence in the development strategy of Chernivtsi region stimulates the synergic effects in the region's subsystems.

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