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## THE MODELLING OF THE IMPACT OF LOGISTICS ON THE EFFECTIVENESS OF FOREIGN ECONOMIC ACTIVITY OF THE ODESSA REGION (ON THE BASIS OF THE STATE ENTERPRISE “ODESSA COMMERCIAL SEA PORT”)

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*Козак Ю.Г., Онофрей І.В., Логвінова Н.С. Моделювання впливу логістики на ефективність зовнішньоекономічної діяльності Одеського регіону (на базі державного підприємства «Одеський морський торговий порт»).*

В данні статті розглядається модель впливу логістичного підприємства на ефективність зовнішньоекономічної діяльності Одеського регіону. Результати дослідження можуть бути використані для створення морського портового кластеру.

*Ключові слова:* зовнішньоекономічна діяльність, моделювання економічних процесів, морський портовий кластер.

*Козак Ю.Г., Онофрей І.В., Логвінова Н.С. Моделирование влияния логистики на эффективность внешнеэкономической деятельности Одесского региона (на базе государственного предприятия «Одесский морской торговый порт»).*

В данной статье рассматривается модель влияния логистического предприятия на эффективность внешнеэкономической деятельности Одесского региона. Результаты исследования могут быть использованы для создания морского портового кластера.

*Ключевые слова:* внешнеэкономическая деятельность, моделирование экономических процессов, морской портовый кластер.

*Kozak Y., Onofrei I., Logvinova N. The modelling of the impact of logistics on the effectiveness of foreign economic activity of the Odessa region (on the basis of the state enterprise “Odessa commercial sea port”).*

Given article considers model of influence of the logistical enterprise on efficiency of foreign economic activity of the Odessa region. The received results can be used on creation of the marine seaport clusters.

*Keywords:* foreign economic activity, modelling of economic processes, the Maritime Seaport Cluster.

The search for new and effective mechanisms of globalization and ways to mobilize resources in the regions for further dynamic social and economic development in the medium and long term perspective is the number one task nowadays for world economies. However, many experts and scientists from different countries turn attention to find adequate economic and mathematical models to the given reality, able to reflect and address the urgent problems of improving the competitiveness and diversification of regional economies. During last decade the development of models that describe the impact on the economy of various enterprises, including opportunities and mechanisms to improve the efficiency of foreign economic activity in the region through the use of certain instruments became necessary.

Many works of both domestic and foreign scholars and scientists are dedicated nowadays to the issue of modeling of economic processes, as well as problems of foreign economic activity.

It should be noted that the issue of efficiency of foreign economic activity of individual industrial enterprises is covered quite extensively. But still up to now there was no research that could examine in detail the mechanisms and models for improving the efficiency of foreign economic activity in the region.

In this research paper, the main task is to describe and disclose the impact of the Odessa port on the efficiency of foreign economic activity in the region using created model.

For the calculation of efficiency of foreign economic activity of the Odessa region is suggested to use a “Region-Cluster” model. First for this purpose the methods of economic-mathematical modeling are applied.

Pursuing the structure of this model which is offered, there are three levels, which are determined by the groups of factors and special indexes. This model allowed us to form the unique method of calculation of efficiency of foreign economic activity of region through Odessa port.

Our method includes such steps:

1) For providing comparableness of data of various years we will correct the monetary indicators on the accumulated size of deflator. The indexes of

the prices of the year 2009 should be taken (previous year to the research).

2) Calculations should be taken after a formula 1.

$$D_i^A = D_{i+1} \times D_{i+1}^A, \quad (1)$$

where

$D_{i+1}$  - deflator for the next year after  $i$ -d year;

$D_{i+1}^A$  - the accumulated size of deflator for the next year after  $i$ -d year;

$D_n^A = 1$  - prices of 2009 year.

3) The integral indexes should be applied to objectively characterize all categories of efficiency of second level of the offered "Region-Cluster" model: investments in the fixed assets in millions of hryvnas (UAH, national currency), unemployment rate in Odessa region after the methodology of ILO in

percents, turnover of goods of Odessa port in thousands of tones.

4) The real foreign trade turnover in the prices of 2009 should be calculated.

5) Next step is to calculate the correlation of the real commodity turnover in the  $i$ -year (in millions UAH) to turnover of goods of  $i$ -year (in thousands of tons). Value, which is got for turnover of goods for 2009 year we take as a standard, at the same time the calculation index is equal 1 (one).

6) Then we should calculate the turnover of goods in "conditional units of commodity", taking into account the indexes of calculations, that represent high-quality changes in a model, which take place in the structure of loads that are transported through Odessa port.

A model was tested after the Fisher's test which confirmed its adequacy.

The compared data for this model resulted in Table 1.

Table 1. Compared data in the prices of 2009 year in the "Region-Cluster" model \*

Years	GRP real per capita in UAH in the prices of 2009	Investments in the fixed assets of Odessa Port in millions of UAH in the prices of 2009	Turnover of goods in Odessa port in conditional units of commodity	Unemployment rate in a region after the methodology of ILO, %
1999	13 025,87	3 553	11762	12,6
2000	13 474,63	4 733	22294	12,6
2001	14 258,54	7 894	19147	10,3
2002	14 750,14	7 930	25072	6,9
2003	15 626,04	9 313	29339	5,7
2004	17 184,53	12 561	34845	7,4
2005	16 927,52	10 122	30570	5,9
2006	17 756,20	12 555	30888	5,6
2007	19 278,71	14 640	33101	4,8
2008	19 400,09	13 483	36035	4,9
2009	17 451,13	6 426	28008	5,1

\*The data of State Statistics Committee of Ukraine of 1999-2009 years is used.

From this model the direct dependence between a gross regional product per capita and investments in the fixed assets and turnover of goods of port is obvious. Thus there is a reverse dependence between a gross regional product per capita and unemployment rate in the Odessa region.

In accordance with the abovementioned model and conducted calculations we can assert that increase of investments in the fixed assets in the Odessa region on 1 million UAH through port results in growth of gross regional product per capita on 23 copecks (1 UAH = 100 copecks).

Multiplying unemployment on 1 % brings to the loss of 292 UAH over 24 copecks of gross regional product per capita.

Multiplying turnover of goods with a nowadays commodity structure per 1 million tones will result in

multiplying of gross regional product per capita on 7 copecks.

Dynamics of gross regional product of the Odessa region (efficiency of foreign economic activity) per capita in the prices of 2009 year for 1999-2009 years is represented on Fig. 1.

We considered a conditional situation, when from the Odessa region the Odessa port will be withdrawn and how these changes will influence on efficiency of foreign economic activity of Odessa region.

At first, certainly, Odessa region will lose all workers of Odessa port which is 0.32% vid a common amount of economic active population after the methodology of ILO at the Odessa region as of 2009. That means an unemployment rate will grow at once on 0.32% at a current unemployment rate 5.1%. That unemployment rate thus will be 5.42%.

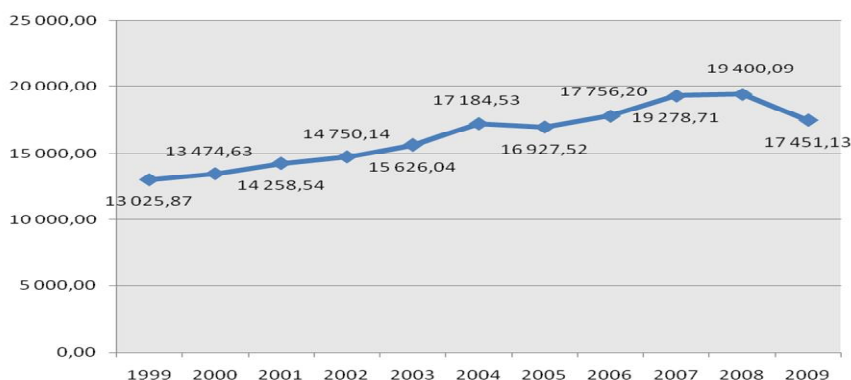


Fig. 1. The dynamics of GRP of the Odessa region (efficiency of foreign economic activity) per capita in the costs of 2009 for 1999-2009 years in UAH

Secondly, investments in the fixed assets of port will diminish accordingly.

In 2009 year the volume of the attracted investments in the Odessa region was 6.426 billion of UAH. If from the Odessa region Odessa Port will be withdrawn, the volume of investments in the fixed assets of region fall down to 5.9346 billion of UAH.

Thirdly, turnover of goods of Odessa port will be absent and will make 0 conditional units of commodity in a model.

That in the case of conditional situation, when from the Odessa region Odessa port will be withdrawn the index of gross regional product per capita will be 14206.16 UAH in the prices of 2009. That means that general efficiency of foreign economic activity of the Odessa region, if we compare it with the current, at once will fall down on

19%. The provided analysis confirms of the last importance of Odessa port for an economy and foreign economic activity of the Odessa region and country on the whole.

Consequently, it enables to talk about possibilities of multiplying influence of port and increase efficiency of foreign economic activity of the Odessa region by means of creation of Maritime Seaport Cluster.

The results and impact of modeling technique presented can be used at sea ports, logistics and other industrial enterprises, as well as other sea port clusters.

This model is universal, so it could be used to design and build sea port clusters and other industry clusters in Ukraine and abroad as well.

#### Список литературы:

1. The official web-site of the State Enterprise "Odessa Commercial Sea Port". – [Electronic source] access mode: [www.port.odessa.ua](http://www.port.odessa.ua)
2. State Statistics Committee of Ukraine. NACE, Rev. 1.1-2002. DK 009:2005 (п.3.1) 26.12.2005 - № 375
3. Statistical data of the State Enterprise "Odessa Commercial Sea Port" 1999-2009 years.
4. Data of the Port dispatcher report
5. The official web-site of State Statistics Committee of Ukraine. – [Electronic source] access mode: [www.ukrstat.gov.ua](http://www.ukrstat.gov.ua)
6. National maritime rating of Ukraine – [Electronic source] access mode: <http://ukrmaritimerating.com/raetings/m-ports.html>

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