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**SYSTEM ANALYSIS EVALUATION OF REGIONAL  
DEVELOPMENT**

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**Abstract**

The paper reveals trends in the progressive development of the Republic of Crimea based on the monitoring of progressive activities. They make it possible to outline the prospects of the progressive growth by the relevant directions (power and transport complexes, social sphere, tourism and recreation, agriculture). Presents tables of statistical information. In order to forecast the level of the regional groundbreaking development under the conditions of lacking the statistic data and to validate the key directions for the economic politics in the groundbreaking sphere as well as to find the number factors which changing allows achieving the outlined results, the economic and mathematical simulation was made. Implemented econometric model of dependency of the indicators data. Data analysis was carried out on different groups and helped to identify the dependence of the structural components. It enables us to estimate the degree of influence of essential factors contributing to the increase of the progressive activity of the business entities on the scope of regional development activities.

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**Keywords:** Progressive development, monitoring, progressive potential, progressive activity, region.

## 1. Introduction

The uniqueness of the modern progressive situation in the Republic of Crimea is in that, on the one hand, there are great fundamental and technological capacities, skilled scientists and engineers, developed scientific and production facilities, in some directions unrivaled; on the other hand – utterly poor focus of this important element on implementation in real innovations. Insufficient use of the progressive potential of the region; the absence of the practical mechanism for stimulation and support of the progressive

entities; an increased amount of information and limited capabilities for its interpretation make urgent the necessity of monitoring progressive activities of enterprises in the Crimean Peninsula and rich of the practical recommendations aimed at optimal ratio of investment and the groundbreaking potential of participants of the groundbreaking activities for their reason able application.

Monitoring is made by systematic observations for development of the progressive processes, analysis and forecast of changes in the course of time as well as assessment of trends in the progressive development to form adequate economic and social programs (Iokhna, 2005).

For this purpose, the key prerequisite for the successful progressive development is activation of the progressive process providing implementation of the priority progressive projects and consolidation of competitiveness of the enterprises. In their turn, the companies being the carriers of the competitive benefits make the base for the competitive success not only in the sphere defined by their business but in all the branches of the regional economy (Arvanitis, 2002; Nyrkov, 2016).

## 2. Methods

### 2.1. The dynamics of factor change and analysis

According to the poll survey among the directors of the leading Crimean companies, the major reason for refusing the implementation of promising progressive developments into the production is lack of self-financing (profit; capabilities for encouraging inner assets, monetary portion of charges of company owners) the early 2000s, equity funds were predominant in the structure of progressive expenses, in 2013, the share of own financial resources reduced more than 80 %, but the share of other sources for funding increased from 0.1 % up to 59.9 % (Fig. 1).

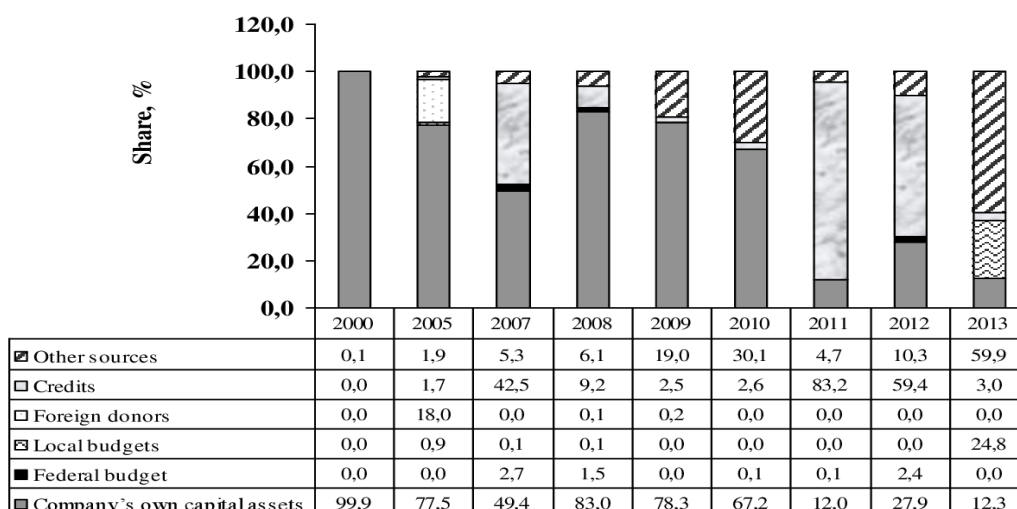


Fig. 1. Structure of sources of funding progressive activities of Crimean companies, % [4].

The almost complete lack of state support for innovation and the reluctance of foreign businesses to make financial investments in the Republic of Crimea (because of sanctions) to attract the attention of local authorities on the need for funding of innovative projects (25% of the total amount of the

progressive expenses was allocated from the local budget in 2013). In particular, the increase in costs was observed in 2011. About 88.2 % of these expenditures were submitted for the purchase of machinery, equipment and software. Regional development in the period of sanctions rather difficult. State support is extremely important for such regions. Investment in support of the region is provided by the government of the Russian Federation. In its turn, it resulted in an increased amount of scientific and R&D activities made by institutions on their own (Fig. 2).

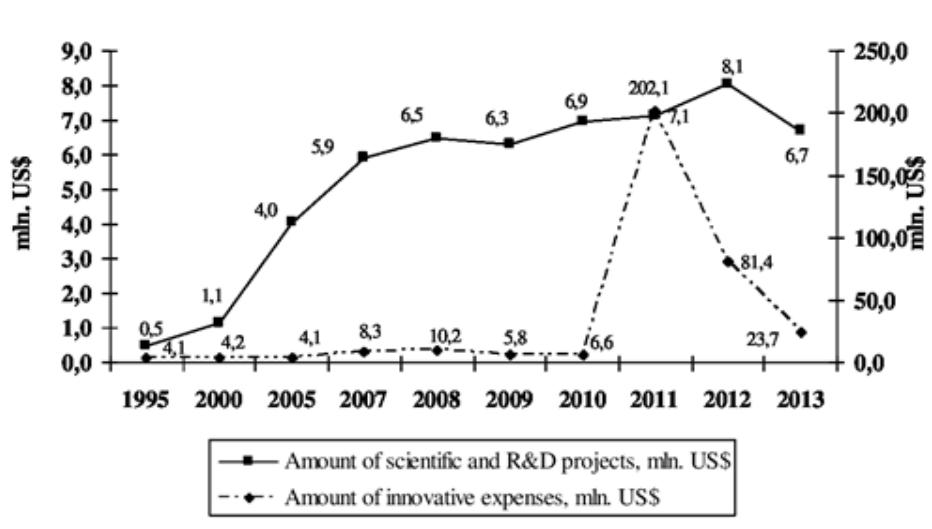
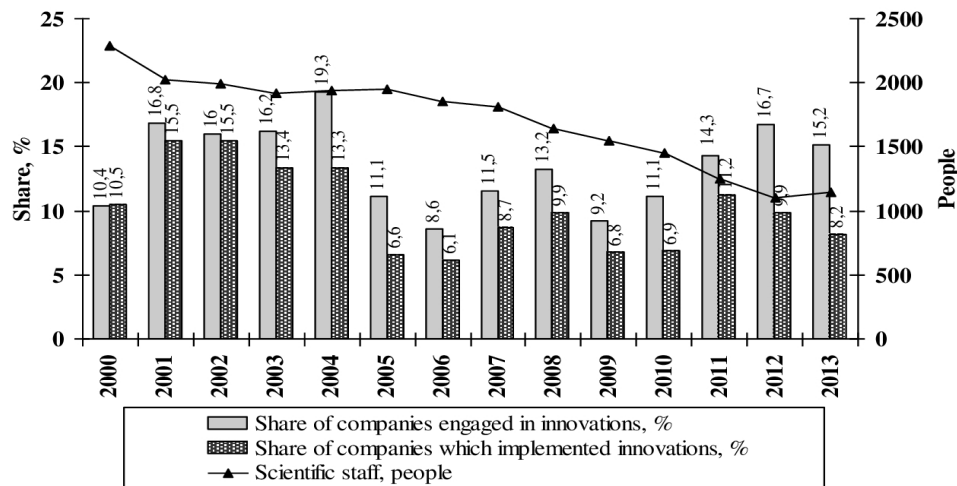


Fig. 2. Interrelation of the amount of scientific and R&D activities and innovation expenses for 2000-2013 in the Republic of Crimea.

Considering the large outflow of scientific personnel (by factor of 2.6 for 1995-2013), since wages are low among research workers and the "age" barrier for comprehensive scientific research (50 % specialists with degree of Dr.Scn. were above 61 years and older), attention must be paid On the growth of modern active industrial enterprises in the region (from 11.9% to 15.2% in the total volume of industrial enterprises). These enterprises, mainly related to the production of food products, including beverages, and tobacco products, electronics and optical instruments, engineering, as well as the production and distribution of electricity, gas and water, are the main participants of a more marginal process in the region. It should be noted a certain disproportion in the dynamics of the development of modern innovative active companies in the regional market can be observed.

An enlarged share of progressive active companies unfortunately does not result in the increased share of the companies that implement innovations, a number of which reduced from 10.5 % down to 8.2 % for 2000-2013 (Fig. 3). Theoretical aspects of the development of cruise tourism is historically based on a comparison of categories of "cruise" and the sea voyage "as a form of transport cruise tourists Services organization (Iokhna, 2005) with many specific properties (Nyrkov, 2016), as well as bringing together companies and organizations involved in the process of establishing cruise tourism products (<http://gosstat.crimea.ru/>).



**Fig. 3.** Interrelation of the number of scientists and a number of progressive active companies in the Republic of Crimea.

At the same time, studying the history of the origin and current state of development of cruise tourism (Aguirre, 2008), classification features and technical components of the cruise ships (Diedrich, 2010) and the organization of the cruise service allowing for the perception of sea cruises by certain categories of cruise ship passengers (Chase, 2002), most authors do not protrude the details of the organization of the coastal service of cruise tourists.

Practical questions of the organization of cruise tourism are reflected in the works (Loizidou, 2016; Bentz, 2016; Wu, 2016; Golikov, 2015), in which scientists systematize the principles of the cruise lines (Loizidou, 2016), analyze the geography of the cruise activities and features of vessels intended for sailing cruise (Bentz, 2016). These publications are studied factors and patterns of structuring the global cruise market (Wu, 2016), as well as issues of modeling passenger cruise rates shipowner (Wu, 2016; Golikov, 2015) and conditions of agency cruise ships.

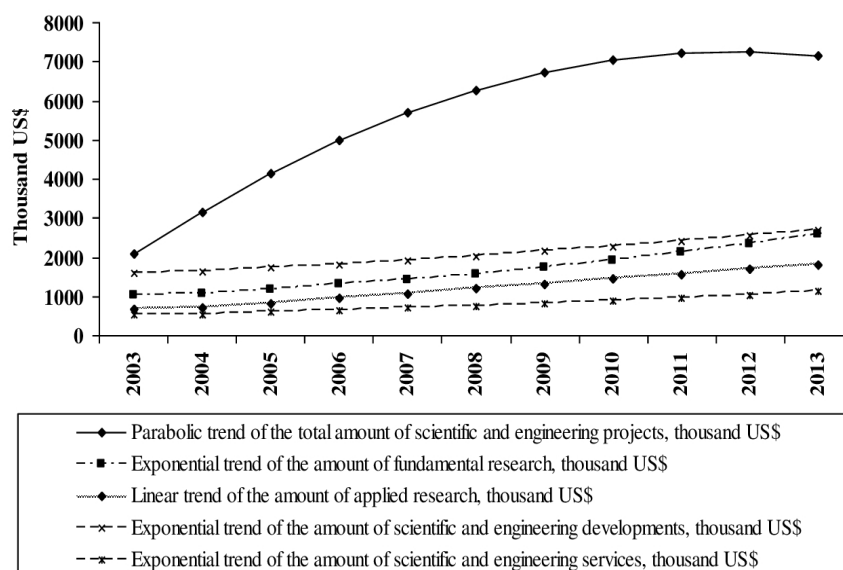
Recognizing the high scientific importance of the work performed by the above-mentioned authors, it should be noted that the available studies remain understudied problem of ensuring effective development of cruise tourism. At the same time, considering the effectiveness of cruise tourism, scientists imply the existence of three types of effect: the economic, social and environmental (Chernyi, 2016; Butler, 2003). However, the complex influence of these types of effects on the effectiveness of the functioning of the cruise industry is not taken into consideration.

Further development requires methodological bases of the organization of cruise tourism, as well as methodological approaches to assessing the level of development of cruise tourism and the practical aspects of increasing the efficiency of its functioning. For example, in (<http://gosstat.crimea.ru/>; Wu, 2016), these issues are reflected only in fragments, without taking into account the specifics of functioning of the Ukrainian cruise market, and especially the establishment of the cruise tourism product for domestic consumers.

## **2.2. Characteristic of the development process in the region**

Analytical graduation of the dynamics of the annual scales of the progressive activities by the Crimean companies for the last decade made it possible to specify the trends of their progressive development.

Figure 4 explicitly demonstrates the trends in changing the amount of scientific and R&D activities with respect to certain directions of the research made for 2003-2013.



**Fig. 4.** Trends of the amounts of scientific and R&D activities in respect to certain directions of the research made by companies for 2003-2013.

Thus, contrasted with the general positive dynamics of the progressive development of the companies in the Republic of Crimea, the amount of the sold progressive products tended to reduction. It proves cutting down in demand for innovations among the population and other institutions and necessitates the comprehensive study of market requirements and correct evaluation of the market situation. The major targets in this study are as follows: analysis of consumers of innovations with their differentiation under demographic, social and economic, geographical, psychological and psycho graphical criteria (Aguirre, 2008). A progressive item of goods should be studied in detail in order to match the information about its technical, operational and other specific features as well as capabilities for the formation of the added user value (Butler, 2003; Camire, 2008).

Analysis of the conditions of the company activity under the given methodology indicates the directions for generating ideas concerning ways to meet the public demand with respect to capabilities of a certain economic entity and consequently serves as a basis for planning its progressive activity in long-term and short-term (1-2 years) periods.

Let us take into consideration the most important factors contributing to the growth of the progressive activity of companies (the general social and economic level of development, availability of skilled staff, investments to the capital facilities, the level of education of population). These can be used in order to forecast the level of progressive development of the region under the condition of lack of statistical information and validation of the key trends of the economic policy in the progressive sphere, as well as to find the quantity parameters, changing which one can achieve the desired outputs. Thus, economic and mathematic simulation was made based on elaboration of the regression-estimated equation. This equation enables one to assess the impact degree of the number of students of higher education institutions per 1000 people ( $x_1$ ); the gross regional product per one employed, mln. US\$/ person ( $x_2$ ); the

ratio of scientific staff per share of economically active population, % ( $x_3$ ); the impact of investments volume to the capital stock per capita, mln. US\$/ person ( $x_4$ ) on the level of the volume of implemented scientific and R&D activities per capita, thousand US\$/person ( $Y$ ). As a result, the following constraint equation was produced:

$$Y = - 3.92 + 0.10x_1 + 2.08x_2 + 8.2x_3 + 0.6x_4 \quad (1)$$

$$R^2=0.98$$

Estimations according to the developed pattern demonstrated that a number of university students per 1000 people have the greatest impact on the volume of scientific and engineering activities (Camire, 2008; Junxiang, 2011; Cambron, 2016; Camire, 2008; Junxiang, 2011; Cambron, 2016).

The enlarged number of these students for 1 % results in the increased volume of innovations for 1.07 %. The level of labor productivity is expressed through the indicator of gross regional product in relation to one worker in public production and has a big impact. Its increase for 1 % contributes to growth of scientific and engineering technologies made by companies on their own for 0.92 %.

### 3. Results

The calculations made according to the composed equation have demonstrated that the most impact on the volume of implemented scientific and scientific and technical works is made by the number of students of higher institutions per 1000 people. Its growth by 1 % causes an increase of the number of innovation development works by 1.07 % (RosStat, 2016). The level of productivity of employees, expressed through the index of the gross regional product per one employed in the social production, the 1 % rise of which enables the 0.92 % increase of the scientific and scientific and technical works, performed by organizations on their own, exert the same amount of influence. This fact fully correlates with the commonly accepted attitude on the importance of the most significant resource of any state – human being. A particular importance for activation of the innovation activity of enterprises belongs to the share of scientific workers per the number of economically active population. This fact is confirmed by the parameters of the regression equation (by the coefficient when  $x_3$ ): the 1 % increase in the number of workers of scientific organizations facilitates the growth of the volume of innovation development works by more than 8 thousand US\$ per capita.

**Table 1.** Formatting trends of the progressive development of the federal district, 2003–2013 (theoretical aspect).

Indicators of progressive development	Regression equation	
	trend	formula
Volume of scientific and R&D activities implemented by companies on their own, thousand US\$, total including:	parabolical	$\hat{y} = 6516.3 + 223.8 \cdot t - 16.8 \cdot t^2$
- fundamental research	exponential	$\hat{y} = 1789.6 \cdot 1.05^t$
- applied research	linear	$\hat{y} = 1254.2 + 62.5t$
Scientific and engineering technologies	exponential	$\hat{y} = 2092.4 \cdot 1.03^t$
- scientific and engineering services	exponential	$\hat{y} = 781.9 \cdot 1.04^t$
The volume of sold progressive products, mln. US\$	parabolical	$\hat{y} = 13.6 - 1.2 \cdot t + 0.3 \cdot t^2$
Number of progressive active industrial companies, pcs	linear	$\hat{y} = 39.00 + 1.115 \cdot t$
Scientific staff, people	linear	$\hat{y} = 1567.8 - 52.4 \cdot t$

**Table 2.** Formatting Trends of the progressive development of Federal District, 2003–2013 (practical aspect).

Indicators of progressive development	Value of F-criterion		Features of parameters in the regression equation
	theoretical	true	
Volume of scientific and R&D activities implemented by companies on their own, thousand US\$, total	4.74	59.59	223.8 thousand US\$ – absolute increment of the volume of scientific and R&D activities; 16.8 thousand US\$ – a half of acceleration with which the volume of scientific and R&D activities changes
including:			
- fundamental research	5.32	24.49	1.05 – mean annual coefficient of the enlargement of scientific and engineering activities
- applied research	5.32	40.59	62.5 thousand US\$ – mean annual increment of applied research volume
Scientific and engineering technologies	5.32	9.63	1.03 – mean annual increment of scientific and engineering technologies volume
- scientific and engineering services	5.32	9.63	1.04 – mean annual increment of scientific and engineering services volume
The volume of sold progressive products, mln. US\$	4.74	19.52	1.2 mln. US\$ – absolute reduction in volume of sold progressive products; 0.3 mln. US\$ – a half of acceleration with which the volume of sold progressive products changes
Number of progressive active industrial companies, pcs	5.32	16.61	1 piece – mean annual absolute increment of progressive active industrial companies
Scientific staff, people	5.32	209.5	52 people – mean annual absolute reduction of scientific staff

Therewith, despite the general positive dynamics, one may talk about breakthrough only in the case the synergetic effect will be achieved due to the development of innovations and high technologies in the scientific and higher educational institutions (Junxiang, 2011; Cambron, 2016; Hu, 2012).

#### 4. Conclusion

One of the ways to increase the progressive activities of companies in the region is to create a regional progressive cluster by combining relevant companies, scientific and research organizations, governmental and financial institutions in a certain sphere (recreation and tourism, fuel and energy, social, etc.). This cluster would contribute to the efficient use of competitive benefits and provide effective progressive development of the region based on the synergetic cooperation of all the participants. Building up the model of functioning the progressive cluster should be based on certain quality parameters. They are coherence of the cluster, which characterizes the level of mutual influence of its components as well as their access to the necessary resources; the effect of synergy representing a set of potentials of the cluster participants; a cluster basic element making a main contribution to the organization of interactions and being a driving motive of the system; a cluster nuclei comprising the organizations providing the main output of its performance; reserves of increase. The value of the investment is very important to support the regions which are under sanctions.

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