International Journal of Engineering & Technology, 7 (4.25) (2018) 198-200

International Journal of Engineering & Technology

Website: www.sciencepubco.com/index.php/IJET

Research paper

Features of Formation of Regional Reproductive Proportions in Modern Conditions Annotation

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Abstract

The article considers the approaches to regional development and management of regional subsystem. The processes of management of territorial organization of production are researched from the standpoint of reproduction approach. The approaches to strategic management of the region in modern conditions are analysed. The main contradictions, which the management system faces in modern conditions, are revealed, and the ways of their overcoming are shown.

Keywords: *industrial complex, economic region, region, social and economic development, efficiency.*

1. Introduction

In modern economics, the problems of coordination of industrial and regional aspects of strategic planning, the industry-wide prospective tasks and their territorial resolution are solved on the basis of optimization approach, using the methods of economic and mathematical modelling [1].

Ensuring the rational combination of industrial and regional strategic planning determines the need for their formation on the basis of such principles as consistency, hierarchy, coordination, industrial and territorial balance, the unity of information base for the development of industrial and regional interests.

The issues of selection the optimal criterion and a system of indicators for coordination of macroeconomic, industrial and regional plans for strategic development have been repeatedly considered in the economic literature [2, 3].

Their solution is connected with the theory of economic efficiency of social production, with the methodology of planning the optimal functioning of the entire economic system, with the peculiarities of formation of costs and benefits in industrial and regional subsystems.

When choosing the optimal criterion, with regard to various classes of tasks for coordination of industrial and regional strategic planning, the following points, following from the methodology of macroeconomic equilibrium, should be taken into account. Economic efficiency of industry development is largely determined by the concentration and specialization of production, while the effectiveness of functioning of the industry branches in the region is determined by their contribution to the achievement of final results [4]. The concentration and specialization of production are the factors, which save labour and material costs, fixed assets and capital investments. But at the same time, they can cause increased expenses for the development of related industries, production and social infrastructures, within one region. Consequently, when coordinating the industrial and regional proportions of development of the considered branches, the optimal criterion should be consistent with the costs and benefits, both in the sphere of production and in the consumption of relevant products.

The best practice of using of economic and mathematical models in the planning made it possible to formulate a number of requirements for them [5, 6]. First of all, the model must be designed for solving specific problems, and that requires the modification of many well-known models. Secondly, the planned models should take into account the totality of factors, which determine the trajectory of development of macroeconomics, industry, region. Thirdly, the models, which allow to solve fundamentally new planning and economic tasks, require new information, and the creation of a special regulatory framework. In this regard, the position of some specialists is inappropriate, since they believe that only those models, which are based on information, existing in statistics, are applicable in the practice of strategic planning.

In relation to the goals of the authors' research, the direction, which focuses on the practical use of the system of models of macroeconomic planning in the industrial and regional perspectives, is of much greater interest.

The analysis of the tasks of industrial and regional strategic planning coordination made it possible to determine rational methods for their solving [7-10]. If the method of interindustry balance is the most characteristic for industrial planning, then to ensure a combination of industrial and regional planning, the program-oriented approach is more expedient.

For the use at the preliminary stages of perspective planning, this approach provides the development of variants of basic directions indicators and a draft plan. They ensure the achievement of target objectives of social and economic development of the country, and consistent coordination of industry and territorial planning decisions [11]. The system is based on the following key principles:

- adequate representation of the goals of development of economic system and its separate units, based on the effective combination of decomposition and composition approaches to the construction of the system;
- orientation of the object of strategic planning to the maximum possible degree of achievement of macroeconomic goals;
- selection of the most effective directions of scientific and technical progress;

- consistency of the optimal proportions of development of national economy with the proportions of development of its branches and economic regions;
- ensured consistency of summarizing national economic and detailed indicators of the strategic plan;
- coordination of the main functional parts of strategic development plan with each other and with the subsystems of regional development;
- iterative approach to drawing up a plan, based on the regular exchange of information between the models of different levels and units of the economy;
- use in calculations mainly statistical information, planning and project documentation;
- reflection of the dynamic nature of economic development and the provision of opportunities for future calculations for 10–15 years.

The proportions of development and location of industries are defined on the ground of criterion of minimization of national economic costs, taking into account the following restrictions:

- tasks for the minimum required production volumes of the established nomenclature by stages (years) of the planned period;
- volume of consumption of the most important material resources;
- capital investments, which can be allocated in the planning period for the development of this industry;
- regional limits for production volumes, connected with natural resources (for the extractive industries).

2. Conditions, Research Methods

The task for improvement of the entire economic mechanism of regional complexes is the most important task, facing economic science and practice. The great significance of this problem makes it necessary to develop more accurate methods of analysis and planning of efficiency at various levels. Knowledge of indicators of production efficiency is only a starting point in the solution of this problem. Economic-mathematical methods can solve this problem in the most accurate quantitative form.

Economic indicators take an important place among other objects of economic and mathematical modeling. The models of these indicators serve as the basis for the analysis, planning, promotion and management of construction enterprises. Every phenomenon, process, object of reality, on the one hand, are characterized qualitatively, and on the other – quantitatively. At the same time, both of these characteristics are interrelated and interdependent. The indicators relate to the quantitative characteristic of the object - they represent the intensity of manifestation of linear properties (relations) of the object. Due to the fact, that economic indicators show the intensity of properties of economic processes, the study of factors, determining the movement of these indicators, is of great theoretical and practical importance. The content of performance indicators of the enterprises in the regional complex is represented within this framework.

The common tasks of the economic and mathematical modeling of performance indicators of industrial complex are the following:

- identification of factors, contributing to the movement of studied parameters;
- defining the type of mathematical dependence of indicators and the factors, determining it;
- assessment on this ground the involvement of variations of the studied indicators.

But what is to be guided in determining the factors of production: the technique of expansion the studied indicator of complex effectiveness into factors, or a qualitative logical analysis of cause-and-effect relationships? Since the studies, based on multiplicative models, do not give a clear method for determining the system of efficiency factors, it remains to assume, that the only method for defining the factors is the technique of expansion the indicators into factors. But one can present a great number of such factorial expansions, and each indicator, included in the work, can easily be given a certain qualitative characteristic. In view of the above, it is difficult to conclude, whether the obtained model is comprehensive, in regard to covering the entire set of factors, having an impact to the effectiveness; and whether the cause-and-effect relationships, existing in real economic life, are observed. Moreover, it is obviously wrong to assume, that all factors act according to multiplicative laws, and not, for example, to logarithmic or exponential laws, etc.

Thus, it can be said, that in multiplicative modeling, only those factors, which act according to multiplicative laws, are considered as efficiency factors. These are the factors, whose indicators can be included in a multiplicative scheme for the expansion of performance indicators. As a result, on the ground of this scheme, we cannot investigate the influence of other factors acting, for example, according to additive laws. All this reduces the cognitive and practical value of these types of models, and limits their capabilities.

Therefore, in our opinion, the most correct approach to solving the problem of modeling of performance indicators of regional complexes is to determine a certain set of primary factors, which are defined as a result of the abstract-logical analysis of cause-and-effect relationships. And then, on this basis, the search for the mathematical form of interrelation between factor indicators and performance indicators. It is preferable to start not from a given form of interrelation between factors and performance indicators (for example, multiplicative) and try to find the factors for it, which would have a certain economic meaning and would be connected with the studied performance indicator, but, on the contrary, it is better to find a system of factors, determining production efficiency, and then to define the mathematical form of their interrelation.

This approach (although not completely consistent) is used in economic modeling.

3. Main Part

For a comprehensive analysis of the interaction effect at the regional level, it is necessary, in our opinion, to use generalizing indicators of regional complex development.

The principal methodical approach to solving this problem was developed by the authors.

The formulation of the problem is as follows: it is necessary to define the values of the variables X_{pj} under the conditions of maximizing the total economic effect, i.e. the difference between the reduced costs per consumer unit of construction from implemented and traditional materials, multiplied by the implementation scopes:

$$Q = \max \sum_{p} \sum_{j} (r_{pj} - c_{pj}) x_{pj} \tag{1}$$

The following conditions are taken into account:

$$X_{pj} \geq 0, \tag{2}$$

$$X_{pj} \leq b_{pj}, \tag{3}$$

$$\sum_{p} \sum_{j} x_{pj} k_{mj}^{h} = \Pi_{mt} \tag{4}$$

where: j – is the number of the type of industrial construction or integrated constructible group;

p - is the number of the region-consumer;

C_{pj} - reduced costs per consumer unit of construction of the j-th type of distributed resource, used in the conditions of the p-th region;

r_{pj} - is the reduced costs per consumer unit of construction of the j-th type, made of substitute traditional materials, in the conditions of the p-th region;
b_{rj} - is the marginal requirement for the constructions of the j-th type (made of new materials), in the p-th region, in customer units;
Π_{mt} – is the total amount of distributed material in the t-th year, in appropriate units;
K_{mj}^{h} – is the consumption of the m-th resource per consumer unit of construction of the j-th type, using new types of constructions (design solutions);
x_{pj} - is the volume of constructions of the j-th type, made of new materials, in consumer units, used in the p-th region.
The condition (2) expresses the requirement of unidirectionality of the task. The condition (3) shows that the volume of implemented constructions of the j-th type cannot be higher, than the maximum total need for constructions, made of new materials, in the p-th region. The equation (4) fixes the limit of the total scope of application of new material for all types of constructions and for all regions.
The task, expressed in a given form (1) - (4), is most rationally resolved by the method of ranking of consumer areas (regions of the country), depending on the level of economic efficiency from application of new progressive resources there, instead of traditional ones. Regional index of comparative economic efficiency from application of new progressive industrial constructions, parts of materials ($\tilde{I}_{pm}$) is determined by the equation

$$\tilde{I}_{pm} = \frac{Э_{pm}}{Э_{\delta m}}, \quad (5)$$

where:
$Э_{pm}$ - is the specific value of the annual (integral) economic effect from the use of new m-th resource in the p-th region, instead of traditional resource;
$Э_{\delta m}$ - is the specific value of the annual (integral) economic effect from the use of new m-th resource in the basis region, instead of traditional resource.
After determining the value of $\tilde{I}_{pm}$ index for all regions, they are ranked in the order, corresponding to the decreasing value of this index. When carrying out the intermediate calculations, the total possible scope of use of new progressive resource Π_{mt} in t-th year consistently subtracts the need for it in those regions, where the use of new resource has the greatest potential for economic efficiency. This procedure continues until all the possible scope of use of new m-th resource in t-th year (Π_{mt}) is exhausted. As a result of the calculation, carried out for each region, the estimated volume of application of new resource Π_{pmt} is determined and the optimized structure of those resources is formed, the total application volume of which in the country as a whole in the t-year is smooth.
The estimated demand of each region for traditional resources is defined by taking into account its equivalent substitution with a new resource, using the formula:

$$P_{pkt} = \sum_{i=1}^{i-n} r_{ki} * O_{pit} - \sum_{k=1}^{k=l} K_{mk} d_{mpk} \Delta \Pi_{pmt} \quad (6)$$

where P_{pkt} – is the estimated demand of the p-region for the k-th traditional material resource in the t-th year;
r_{ki} - is the specific indicator of consumption of the k-th material resource in the process of development of the objects from the i-th sector of economy, which were formed in the basis year in the p-th region;
O_{pit} – is he planned volume of construction and installation works in the p-th region, on the t-th sector of the national economy, in the t-th year;
K_{mk} - is the substitution ratio (elasticity), characterizing the ratio of specific costs of the K-th traditional resource and the m-th new progressive type of resource;
D_{mpk} - is the share of application of the m-th resource in the p-th region, which is aimed at ousting the k-th traditional resource;
$\Delta\Pi_{pmt}$ – is the additional volume of application of new m-th resource in the p-th region, in the t-th year (compared to the basis year).

4. Conclusions

Absolute results of calculations on the optimal regional differentiation of industrial indicators of development of reproduction base depend on the volumes and structure of works, accepted as the initial data. Therefore they are the values, which require periodic adjustment during the development and correction of strategic plans. At the same time, relative indicators, and first of all, the indicators of the ratio of growth rates of the use of various types of material resources in different regions of the country appear to be more stable values, retaining their significance, quantitative characteristics of the main directions of development of industrial base in the region.
In this regard, it seems appropriate and expedient to develop consolidated regional medium-term target programs for strategic support of a set of measures for improvement the technical and economic level of production. Consolidated regional strategic target programs should be formed on the basis of territorial differentiation of industrial target programs. The final indicators of consolidated regional strategic target programs should characterize the total integrated impact of the entire set of industrial target programs on the technical and economic indicators of the organizations and enterprises activities, included in the industrial base of a given territory, over the entire period of programs implementation.

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