

A Concept for Program Solution to the Issues of Formation and Development of Territorial-Economic Systems



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Abstract. The paper systematizes problems of territorial development from the perspective of the theories and concepts that are characteristic of traditional socio-economic geography. These problems include the area-integrated, nodal-economic and territorial-industrial ones. The role of socio-economic geography in finding scientific explanation and solution to these problems becomes more important, since it has research programs that reveal the dialectic of the knowledge of territorial organization of society and economy based not on a single theory or on a set of theories, but on their interdisciplinary synthesis. The research program is relatively autonomous from practice and gives it only its most important results that can be used for the organization of program-target management, as well. The goal of the paper is to include an analysis of the relationship between the categories “problem” and “program” in the methodology of research on territorial organization of economy. Based on the experience of national and foreign research, we show that the “problem-program” combination gives an additional effect in the scientific explanation of territorial development, if the “problem” is presented in the form of a complex theoretical or practical question, the answer to which requires both basic and new knowledge, while the “research program” is presented as one of the main units of science (according to I. Lacatos). In this case, the structural-functional dynamics of development of a particular region is considered from the aspect of organizing the work on addressing the problems of a particular type based on research and economic programs. We think that it is advisable to make a transition from research programs to economic programs according to a definite sequence, namely the one which the very problem “goes through” by the following stages:

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scientific search, scientific-technological and organizational-economic. The paper provides examples on the problem of combining the three principles of social development: economic efficiency, social justice and environmental well-being, the anisotropic model of a complex communication networks (according to R. Domański), in the framework of which this problem could be considered, and the problem approach to the analysis of territorial economic structure in the regions of the European North of Russia.

Key words: problem, program, territorial development, territorial complex and territorial-sectoral problems, economic program, scientific research program.

The problem consists in the poor state of a purposeful social system, the solution to which requires overcoming certain difficulties, including those related to obtaining new knowledge. At present, the problem as a category of scientific knowledge and acquisition of practical experience is being considered more from the viewpoint of methodology and organization of mental activity. This means that the problem needs to be understood as a reflection of actual or desired reality; in the course of finding a solution to the problem it is necessary to acquire new knowledge not only about the object under consideration and multiple objects characterizing it, but also about the activity itself. In our case, we are talking about an activity of a special kind, which G.P. Shchedrovitskii designates as “establishment, formation and partial isolation of the design”, when the relation between the natural and the artificial in the objects of our activity is considered [22, p. 67, 68]. The design here is interpreted very broadly, including all phases of forecasting, designing programs, technical, and social projects.

The book by R. Ackoff and F. Emery “On Purposeful Systems” contains the following general idea: the future can be brought closer to the one designed by the subject of management [1]. E.N. Knyazeva supports and develops this methodological position by pointing out that “...people in their processes of perception, thinking and action not so much

reflect the surrounding world, as actively create and construct it”¹. Therefore, the formulation of a problem question largely depends on the outlook of the manager or scientist and on what value and goal they choose. Here the problem is expressed in an ambiguity of philosophical and methodological interpretations of the category “target”, which “serves as a driving force of action, a point of its causation and regulation...” [14, p. 182].

We should also distinguish between “purposefulness” in the objective sense, and “goal-orientation” in the subjective sense. The objective reflects patterns and trends of natural-historical processes. The subjective captures the evaluation of these processes in the framework of specifically organized mental activity, namely through *goal setting* (our intentions), *targeting* (adjustment of intentions under the influence of specific circumstances), and *achievement of the goal* (selection of specific means of obtaining the intended result) [3].

In everyday life the word “problem” is used quite often, but usually off the point. Science and management should abandon this kind of simplicity. If the task at hand is really challenging, but at the same time all inputs are known and not controversial, then it is not a problem. Scientists that study territorial

¹ Knyazeva E.N. *Sinergeticheski konstruiruemiy mir* [Sinergetically reconstructed world]. Available at: <http://spknrdynmov.narod.ru/KnyazevaElena/htm> (accessed 22.08.2017).

development are inclined to consider the “problem” as a category of knowledge, to which one can apply typology and classification.

Under a planning and directive economy, when allocating productive forces of the USSR, there developed a tradition to consider three kinds of problems: area-integrated, nodal-economic, and territorial-industrial.

At the base of identifying and solving the *area-integrated problem* was the experience of development and implementation of the GOELRO Plan (the Plan of the State Commission for Electrification of Russia), and later – carrying out technical and economic calculations on various options for optimizing spatial parameters of production systems. For example, multivariant calculations by N.N. Kolosovsky for the Angarsk project and the Uralo-Kuznetsk integrated plant [9] are regarded as classic, as well as I.P. Bardin, A.E. Probst and V.V. Rikman’s calculations for the Northern coal and metallurgical base with the use of the Pechora basin coals and iron ores of the Kola-Karelian region [6], etc. Researchers at the Institute of Economics and Industrial Engineering within the Siberian Branch of the Academy of Sciences of the USSR consider in the area-integrated framework the problems of formation of the West Siberian oil and gas complex and development of the Baikal-Amur Mainline area. This type of problems was characterized both as industrial-technological, and socio-economic.

Currently (taking into account specific features of market economy and its state regulation) it would be advisable to try likewise to consider and carry out feasibility calculations for various area-integrated problems, for example, for the options of reconstruction and perspective development of the Northern Sea Route and the Volga waterway, the construction

and comprehensive development of the zone intended for construction of Arkhangelsk – Syktyvkar – Solikamsk (Belkomur) railway, etc. It is not a return to planning policy thinking, but awareness of the need for inclusion of particularly important economic entities in the program management system typical of all developed countries.

The area-integrated problem is not directly related to economic zoning, but it is solved with the help of the accumulated scientific, technological, labor and manufacturing potential of economic areas where it is “located”. In connection with this circumstance let us recall that V.M. Chetyrkin (one of the founders of the theory of area-based organization of economy and society) doubted the use of the word “area” because we are not talking about areas but rather about the zones of technologically and economically related enterprises, and industrial and social infrastructure. But the name is now widely used and, apparently, it should not be changed.

V.M. Chetyrkin put forward the idea of the *nodal economic problem* specific for each area, “which ties into a single knot all the facts and phenomena peculiar to this area, which thereby reveals the nature of interdependencies and interactions that unify the diverse production activities in a single production unit (complex); which at the same time reveals the nature of internal and external metabolism occurring in the production process, in the course of employment of people, which provides the most efficient development and strengthening of national industrial specialization in the area” [20, p. 61].

The quoted definition really corresponds to a philosophical interpretation of the category “problem”; however, it is difficult to specify and to use in the study of areas. Since the scientific

authority of Vladimir Mikhailovich Chetyrkin was and remains high, some economic geographers (including the author of the present article) “are glad” to use this definition of the nodal economic problem, but they consider the problem what they do; it turns out that each of them has their own nodal problem. This methodological error, in fact, does no harm to a particular study, as it is usually not aimed at identifying and studying the “problem” in the strict sense implied by V.M. Chetyrkin.

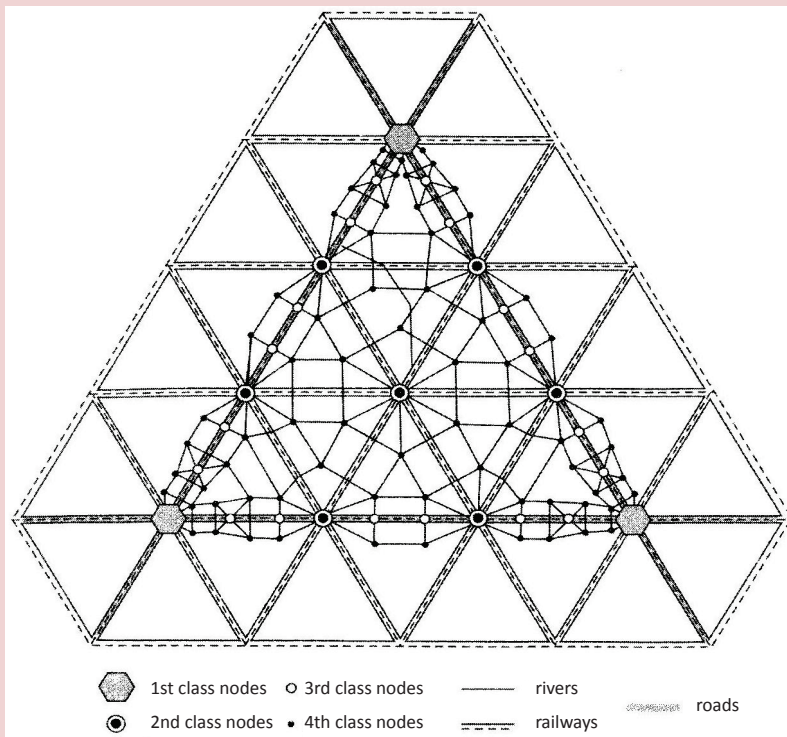
The question about following Chetyrkin’s views still remains open, at least, for the author of the present paper. In order to approach a methodologically correct interpretation of the nodal economic problem, let us consider the following point made by V.M. Chetyrkin: *one and the same socio-economic problem in different areas is solved by different methods taking into account the complex system of natural and economic conditions*. We add to this key position the thesis that methods characterize a diversity of activity; the activity must be organized on a system basis; the problem of actual life (poor state of something) is shifted toward the problem of organizing an activity to handle this dissatisfaction.

This reasoning is most constructively expressed in the article by A.I. Chistobaev and Yu.N. Bazhenov published in 1985 and republished in concise form in the book [21]. “The combination of different socio-economic and natural factors affecting the community and integrity of the territory creates in the process of development a unique combination of problems to be solved in this territory. Defining the boundaries of the problem solution is essentially a zoning of the problem, and the development of methodology, theory and technique of such zoning is problem-based zoning” [ibidem, p. 145].

Example 1. The problem of combining the three principles of social development – economic efficiency, social equity and environmental well-being in relation to the world and to big countries is considered usually in the form of an ideological or political doctrine. Structurally, this problem can be shown at the level of territories that have specific characteristics of social forms of organization of production, distribution of population, natural complexes and climate. These three characteristics in the framework of the problem zoning must be coordinated so that none of them could be in a defective position. It is possible to try and make this kind of coordination in various versions and with the use of various methods starting from (as we see it) the level of such a socio-economic region, the center (or centers) (a more developed part) and the periphery (a less developed part) of which are in spatial interdependence and are connected by a single communication network. The question of whether the problem is nodal-economic (according to Chetyrkin) (?) does not have a clear answer yet.

Example 2. Polish geographer and economist R. Domański who studied the movement of people, wealth and information came to the conclusion that when reaching the greatest degree of approximation to reality the theoretical system of organization of socio-economic space takes the form of an *anisotropic structure when the properties of unequal objects depend on the direction of movement of economic flows within the system* [4, p. 40] (*Figure*). With the development of transport and communications, and with increasing importance of social services and the need for their rapid delivery in every area, including the remote ones, the models (such as anisotropic models) are becoming more constructive; they

Anisotropic model of the complex of communication networks [4, p. 41]



are linked to the size of centers (nodes), to the carrying capacity of linear infrastructure and resilience of environmental framework, and in the end – to the territorial organization of society and its economy.

Let us pay attention once again to the wording of the nodal economic problem. In it V.M. Chetyrkin notes the concepts “interdependence and interaction” and “internal and external metabolism”, which describe the anisotropic model of the territorial complex of communication networks.

Hence, the set of theories and models of territorial development can be regarded as a task to study the problem: to what extent the territorial connectivity of the elements of economic activity determines the nature of their concentration or deconcentration, as well as the configuration of socio-economic space (?); to what extent the properties and qualities of the

territory influence the selection of norms and rules of economic behavior of economic entities forced to reckon with the socio-infrastructurel and natural-environmental constraints of individual areas (?); and whether the challenge of reconciling economic efficiency, social equity and environmental well-being can be considered in isolation within the territorial boundaries of the territorial complex of communication networks (?).

Example 3. If we use the designated model of R. Domański within the boundaries of the Vologda – Arkhangelsk – Syktyvkar “triangle” and take into account the increasing external orientation of the North European territories on finding solutions to problems of the Arctic, then we will see primarily the need to improve the complex of communication networks, namely: further development of Arkhangelsk seaport as the support base of the Northern Sea Route;

construction of the Belkomur railway² (the right edge of the model); construction and repair of motor roads; reconstruction of waterways in the Pechora, Northern Dvina, Sukhona, Vychegda, and other rivers³. Next, let us pay attention to the economic nodes of different classes (in the model by R. Domański, four classes are allocated). Based on these characteristics, the territorial economic structure of the Dvina-Pechora area can be characterized as linear-nodal with the presence of remote areas (economically remote periphery). Here the rivers and traffic arteries predetermined the configuration of human settlement in the long term.

² The combination of scientific and research, scientific and technological and organizational and economic substantiation of the railway Arkhangelsk – Syktyvkar – Solikamsk – Perm (Belkomur) is sufficient to begin its construction. Additionally we could specify the following: the establishment of a reliable railway connecting the Urals and Siberia with the European North of Russia with consideration of the Arctic vector of development of world economic relations is a natural-historical necessity and a vital need for more than one million inhabitants of these regions. The main purpose of Belkomur is to create favorable conditions of life. Without this railway the socio-economic space of Russia is characterized as flawed.

³ In anisotropic models of a complex of communication networks R. Domański pointed out a significant role of rivers. We also emphasize the special role of rivers in the territorial development of the European North of Russia; such rivers are the Pechora, Northern Dvina, Mezen, Onega, Vychegda, Sukhona. They largely determine the configuration of population settlement, the role of shipping and water supply, the Northern-Arctic vector of economic development of the territory, and ecological parameters of environmental protection. It is necessary to mention that the hydrographic order of maintenance of rivers in the last 20 years deteriorated. The river got out of man's control. The lack of river reclamation, dredging, and maintenance of banks – these factors have a negative impact on the watercourse. Floods have become more damaging, the number of meanders and creeks has increased, the navigating channel has disappeared; there emerged some barriers at the mouths of tributaries that vessels with a draft of 50–80 cm cannot pass. Through navigation became difficult even on the Pechora. All this has reduced the standard of living and quality of life of large numbers of people who previously considered their activity to be connected with rivers. Spring and summer deliveries to the remote areas became possible only by small vessels, and that is why the price of the deliveries has increased in 1.5–2 times. This is also a telling example of a poor state of socio-economic space in the European North of Russia.

Taking into account the northern conditions we have identified three types of territorial-economic systems: 1) “backbone” economic complexes; 2) industrial centers remote from them (industrial periphery), which are based on the development of natural resources and maintenance of infrastructure communications (as a rule, these are centers of cyclical development, which inevitably decay over time, unless there emerges some other economic basis); 3) periphery of an agricultural type (not only agriculture and forestry, but also one which is characterized by rural lifestyle). The distribution of population of the European North of Russia (ENR) according to the specified types of systems is as follows (*Tab. 1*).

The development of ENR in modern conditions is connected not so much with large-scale economic projects creating new energy, mineral and forestry bases (which was previously considered in the framework of the area-integrated problems), as with the improvement of existing regional and local economic systems on the basis of scientific and technological progress and interregional integration. Social and environmental improvement of economic complexes, individual industrial centers and rural periphery becomes a priority; it is necessary to increase the lifespan of existing fields, mines, and mining and timber processing plants with the use of the latest technology, to ensure balanced use of biological resources of the Northern seas, tundra and taiga territories, to create the infrastructure of the Northern Sea Route and to bring local economy in line with the needs of defense facilities. It is on this field of activity that one should search for the nodal economic problem.

The distribution of productive forces is largely due to the solution of *territorial-industrial problems*. Their essence lies in the

Table 1. Distribution of the population of ENR by type of territorial-economic systems (TES), as of January 1, 2016, in %*

| TES | Murmansk Oblast | Karelia Republic | Vologda Oblast | Arkhangelsk Oblast (Including Nenets Autonomous Okrug) | Komi Republic | ENR on the whole |
|-----------------------------|-----------------|------------------|----------------|--|---------------|------------------|
| Backbone TES | 81.6 | 49.4 | 72.7 | 60.7 | 78.9 | 69.1 |
| Industrial periphery | 7.2 | 19.5 | 4.5 | 11.8 | 6.1 | 9.2 |
| Agriculture type periphery | 11.2 | 31.1 | 22.8 | 27.5 | 15.0 | 21.7 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 |
| Population, thousand people | 762 | 630 | 1187 | 1174 | 857 | 4610 |
| * Author's calculations. | | | | | | |

fact that different industries react differently to the complex of natural, economic and social conditions of the area. The problem here lies in the diversity of methods for adapting specific industries to local conditions. The territorial-industrial problem is manifested most clearly in housing construction on the territories with severe climate. Its neglect has led to widespread deformation of footing of buildings and facilities in Vorkuta, Norilsk, Magadan and other settlements in the Arctic and the Far North. Major engineering structures (hydroelectric power plants, bridges, tunnels, pipelines, railways...) are highly sensitive to tectonic splits and seismic faults; forestry and agriculture – to bioclimatic characteristics of the area, etc. thus, special importance is attached to the task of revival of experimental and zonal design and establishment of regional institutions like former “gorproekt” and “promstroiproekt”.

Solutions to these and other problems require appropriate program framework. The problem should pass some sort of test so as to show whether or not it needs to be removed from the system of standard structural and functional control and put in a specially organized program management.

The program in economic activities is a tool of management and planning. The program is preceded by analysis (what do we have?), concept (what do we want?), strategy (what

do we do?); as for the program, it answers the question – how do we do it?, i.e. it determines the procedure for solving a specific problem with a full description of actions and methods to achieve the goals; previously it was called network planning. Problems that require a program-based solution should be identified at the stage of strategy development.

The task of programming with respect to our topic can be defined as an interconnection of three types of problems discussed above (area-integrated, nodal-economic, and territorial-industrial) within the boundaries of specific areas and with the obligatory account of specifics of economic management activity. Here we mean that many functions of the state concerning the location of production moved into the sector of corporate planning. But the general line of territorial development of the country should remain in the jurisdiction of the state. It is appropriate to recall the words of the famous American economic geographer R. Estall, who wrote contrary to the market euphoria: “...the free enterprise system (according to the theory of Myrdal) in the case when significant differences emerge in the level of economic development between regions (whatever the reason) the “natural” forces of economic development tend to stimulate further growth of well-being of prosperous regions, often to the detriment of

others. To avoid this, you need relevant power. Under current conditions, it is government intervention that must be such a power” [23, p. 385].

R. Estall cites examples of such interference of the U.S. government. In 1968, it had identified six areas of economic development that do not coincide with the boundaries of the states; the areas are as follows: Four Corners, the Ozarks, Appalachians, Coastal Plains, New England, and Upper Great Lakes [ibidem, p. 394]. Programs for accelerated development (reconstruction) by stimulating entrepreneurship, federal subsidies and tax incentives were developed and implemented for each of them. We also recall that the government of Franklin D. Roosevelt responded to the crisis of the 1930s (in terms of regulation of territorial development) by launching the Tennessee Valley Authority project with a very interesting system of contractual relations between the leadership of the program, states and federation [2].

In our country there is also an understanding of a very clear distinction of the functions of government and business in implementation of regional development strategies and programs. For instance, V.A. Kryukov considers that “the Far Eastern economy can be boosted by the presence of a strong state in structurally important projects and investments like roads, ports, and energy. But everything else should be left to the will and propensity to risk of those who are willing to implement their potential and get a high score (as a cost of risk)... The question is how to bring intelligence to the Far Eastern economy... We should not be afraid that this will be a resource-based economy, it is necessary to ensure that it is a resource-based but intelligence intensive economy based on the activity of venturesome and creativity-oriented

entrepreneurs”⁴. The formal aspect of this approach is currently seen quite clearly. There is the Ministry for the Development of the Russian Far East, it coordinates the implementation of state programs and federal target programs; the Corporation for Development of the Far East has been established and it manages territories of priority socio-economic development that should attract (in theory) business.

But let us remember that this situation brings to the fore the task of correct assessment not only of the overall effectiveness of the state and corporations, but also of the consequences of their separated activities for all regions of the country [7]. In past years, such responsibility was differentiated by levels of government, including ministries, and it was linked to programs of specific territorial types: pendulum, front, focal (including the development of program-target territorial and industrial complexes), and local [15]. Currently, such responsibility should be, apparently, identified in the contractual relations between those who draft and implement regional programs.

In scientific work, the “program” also occupies a special place. Imre Lakatos was the first to prove that research program is one of the basic units of scientific knowledge; it (the program) is a set of theories connected by common fundamental ideas and principles; its methodology explains a relative autonomy of theoretical science [12]. I. Lakatos wrote: “According to my methodology the great scientific achievements are research programmes that can be evaluated *in terms of progressive and degenerating problemshifts* [emphasis added. – V.L.]; and scientific revolutions consisting of one research programme superseding (overtaking

⁴ Kryukov V.A. *O razvitií Dal'negó Vostoka* [On the development of the Far East]. Available at: <https://www.sbras.ru/ru/news/39274/> (accessed: 24.08.2017).

in progress) another. This methodology offers a new rational reconstruction of science. This methodological concept offers a new way of rational reconstruction of science... The basic unit of appraisal must be not an isolated theory or conjunction of theories but rather a “*research program*”⁵.

The harmonization of internal structural elements of research programs (axioms, hypotheses, theories) usually leads to interdisciplinarity. This is natural, since any object of a comprehensive study is multidisciplinary. In addition, the interdisciplinary approach increases the possibility of refutation of a particular scientific research program, which is essential condition of the dialectic of scientific knowledge. In the framework of one science such refutation is sometimes difficult, but it is feasible with the help of other sciences.

The work within the framework of “problem – program” for Russian geographers, economists, philosophers seems routine and its technology is more or less clear. In economic geography it is briefly expressed in the thesis: “Problematic zoning is an integral part of program-target planning” [21, p. 146]. An example of a broad methodological consideration of the “problem – program” pair can be found in a collection of scientific papers [8], which back in 1987 defined the role of research program in development of entire science (M.A. Rozov: “...Science is... nothing but a way of existence and development of such programs”, p. 11) and its individual disciplines, including economic and social geography (B.A. Shuper: “All the best theoretical findings by geographers were obtained with the help of constructing research programs in which the

categories and methods of mathematics and other sciences were transferred”, pp. 203–219). A more recent example is a monograph by P.A. Minakir and A.N. Demyanenko, in which the works of I. Lakatos are applied to spatial economics as a research program [16]. Philosophers draw our attention to the difference between research and collection (gathering) programs. The latter do not use research as a process of obtaining new knowledge, but show the system of scientific findings necessary to understand the nature of the problem at hand [19].

We emphasize another important point. The methodology of program-research thinking sometimes leads to the conclusion that the paradigm of a particular science needs to be changed. A.E. Levintov proposes to adopt this “extraordinary” decision with regard to economic geography: from economic to business geography, from area to region, from zoning of production to selection of types of territorial economic orders [13]. It would mean a restructuring of research programs, which in essence cannot be excluded, but we can try to refute it, providing the scientific community with another research program within the framework of usual “motives” in the geography of social development [5].

The use of research programs in the development and implementation of economic programs is also a kind of problem and one of the challenges of practical importance. Based on the above, we shall proceed from the fact that any doctrine on territorial development that sets out the sequence and connectedness of theories exploring specific or abstract economic-geographic systems in terms of scientific and/or practical problems (including the formation of the culture of geographical thinking) is a research program, to a certain extent. Indeed, many authors of theoretical works on social and

⁵ Lakatos I. *Metodologiya issledovatel'skikh program* [Methodology of research programs]. Moscow: Ast: Ermak, 2003. Pp. 274–275. Available at: // <http://vikent.ru/enc/1929/> (accessed: 21.08.2017)

economic geography and regional economics express their thoughts in the program aspect (what we are dealing with, what and how we should do in accordance with the change of the values of certain theories of territorial organization of society), but most of them implement their own program directions very rarely. Authors are even more seldom engaged in proving the feasibility of replacing previous research programs with their own program for practical reasons. And it is not a coincidence, since the transition from theory to practice requires special methodological explanation.

In our work [10] we make an attempt to show the transition from research program to economic program by answering the following questions: how can we apply a set of interrelated studies and scientific concepts on spatial development (study of geosystems, theory of social space, scientific concepts of “function of the area”, “center – periphery”, “regional

property”, “territorial economy”, etc.) to actual development of specific territories with regard to their properties and qualities? (Tab. 2). It is suggested to be implemented with the help of systematization and organization of services of geographic activities and revision of the content of spatial planning. However, there may be other judgments.

The following questions are of interest: can there be a combination of these theories and concepts in one research program if they fully or partially “deny” each other (?) (apparently, something would have to be excluded); is the selection of the theories and concepts a collector program rather than a scientific research program?

Although the author tried to pair the basic concepts and methods of related sciences (first of all, socio-economic geography and regional economics), assuming that such a pair determines the meaning of interdisciplinarity

Table 2. Formation of research programs on the subject of territorial development [10]

| Theories and concepts | Brief statement of the source position for a research program on the subject of territorial development |
|--|---|
| Socio-economic geography | |
| Theory of formation of areas and the territorial-industrial complexes approach | Productive forces form territorial complexes. |
| Theory of linear-nodal structures | Distribution of population and production is in the form of territorial nodes, communication networks and economic landscapes. |
| Concept “center–periphery” | The negative syndrome of periphery is overcome by introducing economically remote territories to the scientific and technological potential of central territories. |
| Idea of subject regions and interregional spaces | The region is an arena of activities and interests of different regional actors, including individuals. An individual is unique, so is their environment. |
| Theory of socio-economic space | Every kind of social and economic activity has its spatial boundaries. The activity determines the space. |
| Doctrine on geosystems | Natural and social geosystems have dimensional consistency and form the complexes “nature – population – economy”. |
| Concept “function of the area” | A certain part of geographical space bears (or can bear) an economic function conditioned by its natural and social characteristics. |
| Regional economy | |
| Concept of regional ownership and territorial management | Regions (constituent entities of the federation), municipalities and self-governing territories have the property that they multiply and use for the public good. |
| Mechanism of development of territorial-economic systems | Economic and management mechanisms have a specific form of manifestation in relation to territorial development. |

and sometimes leads to new scientific results in the study of territorial-economic system, there still remains some doubt concerning the correct choice of an algorithm for obtaining the synthesized knowledge and its inclusion in the program of economic activities.

As for the problems of spatial development of the whole European North of Russia, we have found only one book written in the “research program” key [18]. It was published in 1966 and is devoted to the study of natural conditions and natural resources in connection with certain areas of resource management. It was mostly this book that motivated us to consider programs that deal with the North to be research programs if:

- natural, economic and social basis of life of specific communities of people is represented as a whole in the form of natural-economic complexes (geosystems);
- the study of specific geosystems takes into consideration “cross-cutting” specific northern characteristics (climate discomfort, permafrost in some areas, polar nights and days, snow and ice, lack of heat and excess of moisture, lack of ultraviolet, unique natural

resources, traditional agriculture of indigenous ethnic groups, etc.);

- in addition to “cross-cutting” characteristics, the specific features of areas are taken into account⁶ [11; 2017].

Transition from research programs to economic development programs was expressed in 1972 by V.S. Preobrazhensky in the following phrase: “A scientific problem mostly takes the following path: first it is a problem of scientific search, then it becomes a scientific and technological problem, and after that transforms into an economic and organizational problem. Understanding these differences is essential for the optimal organization of work of scientists and for the rational construction of a system of geographical services” [17, p. 16].

At the scientific and exploratory stage of “life” of the problem there is a scientific explanation of the content of the object of study; arrangement of properties, qualities and relationships of the object in a certain order; analytical division of the object into parts and their subsequent grouping according to substantial grounds and much more, which is the essence of a research program.

⁶ For example, the *Karelia-Kola area* of the European North of Russia has the following features: the Baltic Shield, a compressed space of the global watershed, denudation (bare, slightly covered by loose Quaternary deposits) plains, rugged terrain, active metallic and nonmetallic mineralization, the abundance of lakes and small rivers suitable for obtaining hydropower, ice-free coast of the Barents Sea; the border (Nordic-Finnish) position. These characteristic features of the area determine the requirements for the modernization of the mining and forestry industry, development of the western coast of the White Sea, the improvement of transport and power communications, tourism development and creation of environmental systems, taking into account the global value of the meridional strip of the lake, forming the northern areas of “green” agriculture, coordination of relations with Finland, Sweden and Norway.

The *Dvina-Pechora area* of the European North of Russia includes the north-east of the East European Plain (in the geological aspect – the Russian craton) with very active tectonics and mineral formation (geological potential of the North-East of the Russian craton, along with Northern and Polar Ural, according to our calculations is 5–6 times higher than its other parts, which resulted in the accumulation of hydrocarbons and concentration of solid minerals); deep rivers that could be used as transport routes and fishing sources, large bays of the White Sea, landscape diversity in the taiga and tundra; the global watershed that stretches across the southern border of the region; ethnic and cultural diversity. Regarding this characteristic, we can determine that the most relevant issues for the Dvina-Pechora area are the issues of comprehensive use of resources of the Timan-Pechora oil and gas province and Timano-Severouralsk minerals and raw materials combination. Primary tasks in forestry are forest economic zoning and removal of threats related to undesirable change of tree species and drying out of spruce forests. The potential of agriculture in the areas of middle and southern taiga and mixed forest zones is necessary to enhance with the help of the measures aimed at the restoration and improvement of soil fertility and in the zones of forest-and-tundra and tundra – preservation of mosses and lichens as fodder base for reindeer husbandry.

Table 3. Program solution to the problem of formation and development of territorial-economic systems that meet the requirements of economic efficiency, social equity and environmental well-being

| Program | Subject of activity in the sphere: | | |
|-----------------------------|--|---|--|
| | Economic | Social | Environmental |
| Research | Increase in productivity through a balanced use of territorial resources of public purpose | Overcoming social inferiority of the periphery within the borders of the territorial communities of people | Allocation of eco-economic complexes as objects of social reproduction |
| Research and technological | Technical and economic calculations to optimize territorial balance of resources of public purpose | Designing social space for comfortable living | Geo-ecological design and development of proportions of reproduction of natural resource potential of the territories |
| Organizational and economic | Improvement of mechanisms of territorial organization of economy | Development of norms and rules of social security of the population taking into account natural and geographical features of its settlement | Development of rules and regulations for environmental functions, taking into account specific features of natural resource cycles |

The scientific-technological stage adapts the theory to practical needs, highlighting theoretical results that are most important for solving specific tasks.

The economic-organizational stage includes the ranking and sequence of practical actions toward achieving the goals; formation of organizational structures and institutions for managing the process of acquisition of new knowledge; replication of pilot design products in mass production and use.

As applied to the subject of territorial development, the programming structure is shown in *Tab. 3*. It follows from the table that it is necessary to consider the danger of exaggerated simplicity in understanding the relationship between science and practice. Science refers to practice on the basis of theory, in the form of attempts to check the accuracy of its research programs; practice refers to science on the basis of experience, including the experience in the development and implementation of economic programs

and other strategic planning documents. At the junction there emerges a special kind of methodology for obtaining the knowledge on how to move from theory to practice.

We also indicate one important fact: it is not a research program that is transformed for practical purposes, but its results, if practice is ready to use them. This very circumstance provides relative autonomy for the development of the theory.

Thus, among the problems of territorial development (area-integrated, nodal-economic, and territorial-industrial) the nodal-economic problem of a particular area (region) is the most difficult for understanding and practical application. We admit that this type of problem can include the ambiguity of the choice of means and methods of harmonizing the three components of social development – economic efficiency, social equity and environmental well-being – taking into consideration the properties and qualities of particular natural-economic

complexes. Not all socio-economic problems are included in the system of program and target management, but only those that cannot be solved by standard structural-functional management. The target program must include a block of generalization of the most important results of relevant research programs.

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