THEORY AND METHODOLOGY OF SOCIOLOGY

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*THEORETICAL, METHODOLOGICAL AND APPLIED ASPECTS OF INTERACTION OF THE COMPONENTS OF A REGIONAL INNOVATIVE SYSTEM**

SUMMARY. The problem of the study, revealed in this article is related to the need to rethink the methodological basis of studying the conditions of development of regional innovation systems and the change of the estimation vector of the regional innovation system — from a technological to a social one. It is also necessary to study the mechanisms of transition of Russian society to innovative development at the regional level. Theoretical and applied aspects of the project are aimed at ensuring the effective capabilities for the management subsystem of the analysis of conditions (economic, social, sociocultural, managerial, organizational, technical and other) for innovation development in the region, the identification and analysis of the interaction of the factors of innovation development, in particular the level and nature of social innovation and population assessment. Since the studied issue is multifactorial, in this article we will look at some of the conceptual foundations of the study, and two regional societal processes: the nature of innovation diffusion and types of innovation activity, as well as the index assessment of measures potentially promoting intensive innovative development of the region. The empirical base of the research is a questionnaire survey of the population of active working age from 18 to 60. Sample territorial quota by gender and age is represented by the population of the three sub-regions: the south of the Tyumen Region, Khanty-Mansiysk — Yugra, and the Yamalo-Nenets Autonomous District. The sample size is 1884 people. Sampling error is 2.5% for one selection principle.

KEY WORDS. Innovation, diffusion, societal process, contingency, paradigm

Within the framework of conceptual aspects of our project which focuses upon a regional innovative system, the environmental approach should be recognized as most

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frequently implemented. This approach is being worked out by the members of Innovation Development Club of the Institute for Philosophy of the Russian Academy of Sciences (RAS). At the head of this research group is V.E.Lepsky.

The environmental paradigm rests upon a set of civilization development values and it is regarded as a self-evolving system, wherein the notion of "environment" is being treated to a certain degree as *absolute* because this sphere serves both as the space and the source of innovative activity. According to Lepsky, to shape a friendly innovative environment means first and foremost to shape a space for trust between the state, business and society [1; 137].

Undoubtedly, such a model is stable for the developed western states. For Russia the processes of shaping a space for trust between the state, business and society are weak, the reasons being found, as our research reveals, in numerous divergent factors, and above all, in high risks.

At present, as Lepsky points out, shaping local "spaces for trust" can be treated as the most effective method for overcoming the problems of national innovative system development. The positive practice of innovative development in separate regions of Russia proves it" [1; 118].

It is obvious that in the function of an explanatory model the environmental approach is quite productive. At the same time it does not work when it is necessary to disclose every structural peculiarity, cause-and-effect relationships as well as the integrity and the focus of innovation activity in the region, as the chaotic properties of such environment hamper its cognitive processing, management, as well as the analysis of its content links, which demands a profound theoretical scrutiny.

The analysis of a number of works on the innovation issues reveals that the notion of *the national innovative system (NIS)* is one of the recent kernel notions in our research field. N.I. Lapin singles out the three groups of indicators for NIS that correspond to a standard systemic approach:

1) At the input human potential characteristics as well as characteristics of innovative activity financing are found; 2) Inside the system characteristics of institutional system to which NIS adheres are discovered; 3) At the output the indicators of innovation activity: the number of invented devices, patents, new technologies, products, etc. are registered» [2; 282]. Such an approach resembles a well-known cyber model of a Black Box. Moreover, it considerably streamlines the analysis of its content interdependences.

It is evident that this systemic presentation is applicable to Regional Innovative System (RIS). Moreover, N.I. Lapin emphasizes the role of a region as a subject of the Russian state and society in the development of the national innovative system, which, in our opinion, is crucial for any region, in particular for the Tyumen Region as a whole. Representing a basic level of horizontal differentiation of a country, a region is defined as "a local community of residents, settlements, organizations, whose interrelations are regulated both by central and local institutes, customs and traditions" [2; 186]. According to N.I. Lapin, innovation activity proper takes place both within environmental system and out of it. Yet, however, if the notion of the external

environment receives in his theory an all-sided interpretation, the notion of inner environment, in our opinion, receives a narrower interpretation, as only two variables, "actors" and "organizations", are defined (the variable "social communities" is left undefined).

It is considered necessary to update these parameters in order to determine methodological reference points of the innovation processes at the regional level. These parameters should be regarded within the scope of a more extensive social and cultural approach. It should include into analysis the category of sociality, which will enable researchers to comprehend to a fuller extend how RIS factors interact and how "sociality" develops upon the continuum "technological – social" innovative aspects. This is also a demand of a systemic approach to the innovative activity, as it can effectively be performed only in a completely open system.

With these considerations as a theoretical background we have outlined a preliminary model of RIS for the Tyumen Region.

Scheme 1

REGIONAL INNOVATIVE SYSTEM (RIS): BASIC CHARACTERISTICS

based upon the modification of PEST analysis

INNOVATIVE INFRASTRUCTURE **Tyumen regional techno park:** **(innovation proposals)** Business incubators Techno park residents The Centre for shaping innovation competences and commercial technologies (jointly with the Ministry for Economic Development);	**ADMINISTRATIVE SYSTEM** **Regional government** **(Administrative system)** Innovation committee of the Tyumen Region Regional agency for venture investments The council for investments development Scientific and technical council for innovations
The "Bortnikov" Foundation (assistance in the development of small businesses in ST Sphere) The support centre for technologies and innovations (World Patent Fund) Industrial sites The "BRAIN" club	**CUSTOMERS – DEMAND** **(Branches of Industry)** Petroleum Industry Building materials Timber industry Agricultural and Industrial Complex (AIC) Oil and gas processing Mechanical Engineering
Higher Education Small Innovation companies	**FINANCING:** Budged Subsidies Grants Co-financing

REGULATORY AND LEGAL FRAMEWORK RF government orders The laws of the Tyumen Region Resolutions of the Tyumen Regional Duma Acts of the Tyumen Region Government Target programmes	**SCIENTIFIC AND EDUCATIONAL POTENTIAL** Tyumen state oil and gas university Tyumen State University Tyumen State Construction and Architectural University Tyumen State Agricultural Academy Tyumen State Medical Academy Institute of Northern Development (IND) Sectoral Research Institutes
INNOVATION ACTIVITY Innovative productive activity: actors (subjects) of innovations, inventors, innovators. Reproductive and routine activity: Businesses and enterprises' staff Value - motivational facts Human capital	**COMPETITION (COMPETITIVE CAPACITY)** The level of import substitution Participation in Federal Target Programmes The increase of Human Potential Development Index (HPDI) Development of Individual Private Businesses and Private Businesses The system of professional education and training General Education
CONSUMERS Population Business	**MASS MEDIA** Regional information internet portal on innovative activity Specialized printed editions MASS MEDIA

Undoubtedly, in order to profoundly analyse cause-and-effect dependences and afterwards synthesize the variables of the model, it is necessary to rely on voluminous sociological research and works both of theoretical and applied character, above all, on the research of the newly-emerged shift from technological to social innovative activity in the global environment. Thus, the 1992 regulations set up by the international agency "Oslo guidelines" at the start were valid only for technological innovations [3], yet, however, already in 1997 they became applicable both for marketing and services.

At present, the theory of "social innovation" can be applicable not only to the state, but also to the civil society, as well as to social entrepreneurship. A great amount of innovation activity research focuses upon the analyses of conditions in the sphere of intersectoral and interbranch cooperation. The notion of diffusion is central for these research projects. Recently, this notion has acquired a paradigmatic status in order to fully comprehend, from a theoretical point of view, the exchange of innovations between branches of global, national and regional economies, which is targeted at

social transformations. Thus, to assess paradigmatic issues, A. Grubler [4], a well-known sociologist, has proposed to single out a triad including *invention, innovation and diffusion*. He treats innovation as a process of initial implementation of invention which lays the foundations for further probable alterations. The diffusion process, according to A.Gruber, is the only one capable to turn this potential into the alteration of social practice. According to Everett M. Rogers's paradigm matrix, diffusion is treated as a process that transmits innovations via particular time-defined channels among members of social system. This is a specific type of communication used to transmit new ideas [5; 19-42].

The issues of the nature of diffusion and its stages are crucial in innovative processes analysis, as well in RIS model and concept construction. As this process is dependent on a variety of factors, further we shall single out only two of them.

The efficiency of innovation diffusion depends to a greater extend on societal determination (like in Japan, for instance), on the phase of life cycle of a social and cultural system, on the volume and character of regional market economy, as well as on the branches of economy. It is equally dependent on the adherence of innovation to a particular sector of economy, the number of innovative enterprises, and their staff, on the RIS targets, values and motivations, on the potential alertness to accept changes not only of particular enterprises and their workers, but of the society as a whole. A regional community can either accept innovations or reject them. The attitude of people is determined by their previous negative experience of innovation implementations. Any novelty in itself should not be regarded as an absolute value, because as life shows, the proportion of precocious, premature, crude innovations is considerable, even at the institutional level, especially in social sphere. Not only do such innovations fall short of people's expectations, but they also cause systemic social, political and technological chaos.

At the same time, it is necessary to provide a more precise definition of "innovation" to be applicable to the situation at the regional level. It should be noted that theoretical aspects of social innovations were scrutinized by P. Druker as early as in the 1950s [6]. J. Shumpeter examined innovation processes within the framework of his "creative destruction" theory and alongside P. Druker proposed to regard innovative activity of entrepreneurs as employment of existing discoveries and inventions to make new products and to offer new services with the help of new ways [7; 12-13].

In our research, that has both theoretical and applied nature, we stick to the definition of social innovations offered by O.V. Kobyak: "Social innovations represent the phenomena in the social sphere of human society that were absent at the previous stage of its development and that came into existence either naturally or by the initiative of administration subjects" [8; 364]. Distinguishing the two types of innovative processes is crucial in this definition. The former that "comes into existence naturally" is a logical consequence of social coordination mechanisms that promote the development of social structure and mutual adaptation of its components. The latter that results from the initiative of administration subjects is determined by the level of its correspondence to the objective social and economic

regulations. Both types serve as a precondition of social progress, yet, however, the dominance of one of them predetermines the character of RIS that takes its shape during a particular time-period, which is, in our opinion, the major target strategy of its administrating. The weak point of the processes that "come into existence naturally" is determined by the low level of risk tolerance threshold among entrepreneurs as economic losses resulting from the failure of innovative process can be catastrophic for it.

According to our RIS model, the causes and sources of social innovations may belong both to inner environment of the system (the level and character of regional economy development), and to external environment (the type of national economy development and global economy as a whole). Taking into account this basis, O.V. Kobyak, distinguishes innate, borrowed, stimulated, and expansive types of social innovations. Undoubtedly, each of them has its own particular diffusion variable in RIS.

We presume that the final societal results (natural or initiative innovations) are preconditioned by the sociocultural genotype of a society and its subsystems [8; 134-135], or by a sharp historical shift of this genotype at every level of the society. It takes place under a strong impact of external environment factors as it happened, for instance, with the social-and-cultural system of Japan after World War II. This system has acquired alertness to accept global changes which resulted in the high level of the adaptive effect of NIS.

We assume that innovative culture can be regarded as one of the basic characteristics of sociocultural genotype. This culture can be defined as a historically and territorially preconditioned, steady system of norms, regulations and ways to implement innovations into different spheres of society. Its special significance for RIS is linked to a historic capability of specific models and innovation actions algorithms to be adapted in a concrete society, which comprises the inner sociocultural mechanism of innovative behavior of this process various actors.

The assessment of social aspects of innovation diffusion in RIS is one of the main objectives in our research. Undoubtedly, the current state of innovation system components as well as the impact of inner and external environment upon innovative activity and upon diffusion processes should be regarded as a general factor of its development. In our research to solve this problem we have made use of two groups of the variables. The first group includes types of RIS support at the principal stages of innovative activity process (7 variables); the second group includes steps that potentially promote for the development of RIS (8 variables). Data analysis revealed significant differences that depend on the nature of innovation diffusion process.

At the level of the whole regional innovative system, the hierarchy of diffusion factors (in percentage to the number of respondents) is the following:

- approval – 63.9%
- technical support – 22.4%
- financial support – 20.5%
- administrative support – 19.0%

Table 1

Interdependence of the diffusion process nature and types of innovative activity (in % to the number of respondents)

The nature of diffusion		The form of a respondent's participation in the innovation activity						Diffusion volume upon the whole bulk
		As the author of an idea	As a collaborator	A working team member	As a technical executor	In the implementation group	Sales market investigator	
Reaction from the immediate environment	1.Approval	26.7	18.3	32.1	35.9	17.6	16.8	63.9/ 100%
	3.Financial support	26.2	23.8	38.1	28.6	11.9	14.3	20.5/ 100%
	2.Technical support	19.6	28.3	34.8	37.0	13.0	17.4	22.4/ 100%
	4.Administrative support	15.4	12.8	41.0	30.8	23.1	5.1	19.0/ 100%
	5.Absence of responses	9.1	18.2	31.8	45.5	4.5	9.1	10.7/ 100%
	6.Negative reaction and resistance	29.2	33.3	33.3	11.1	22.2	33.3	4.4/ 100%
	7.Difficulties caused by competitors	22.2	16.7	16.7	22.2	27.8	44.4	8.8/ 100%
	Other	-	-	100.0	100.0	-	-	0.5

Taking into account the specificity of this factor structure, there is no doubt that for a true innovator even a simple approval of their activity is an important inducement. Moreover, as this factor is typical of the whole region, it testifies to a general friendly attitude to innovation activity in the region. Definitely, the presence of material factors helps to extrapolate this process into practical sphere. Evidently, when we consider the stages of innovation process, we observe that these factors are unevenly dispersed.

As it follows from the table, the highest level of diffusion is observed at the two stages of the innovation process: at the stages of the innovation development and its technical implementation (more than 30% of responses). Such indicators as "authors of innovative ideas", "collaborators", "implementation groups", "marketing groups" have a much lower percentage. Thus, this structure of the diffusion process in the RIS of the region allows arriving at the conclusion that it is being implemented under the impact of the four global factors. They are:

- moral approval of innovative activity (69% of responses);
- a three-component factor, including technical, financial and administrative support (61.9%);
- resistance (diffusion barriers), absence of responses (i.e. indifference); negative attitude to innovative activity comprises 13.2% of responses;
- competition (8.8% of responses that point to the problems caused by competitors).

Competition in developed countries and innovation systems are considered as a driving force of social and economic development. For the Tyumen Region system, the current type of competition is a competition aimed not at the innovation product itself, but at all types of resources that are necessary to produce it.

This research reveals that within the framework of diffusion moral and financial support is delivered primarily to technical executors of innovative projects, to members of implementation groups (first and second places), authors and collaborators of innovative ideas (steady third and second places), implementation and marketing groups (the last place in the process of innovation diffusion). This hierarchy reflects the processes of innovation borrowings rather than natural or expansive processes.

The analysis of diffusion processes at the infrastructural level of RIS development revealed the following hierarchy. In the directions (objects) of innovative activity under analysis, the aggregated magnitude of all types of diffusion that rests exclusively upon the resource support, financial, technical, and administrative helped to reveal the leaders and outsiders of innovation activity in RIS. It represents quite a potent basis for the development of innovative activity upon the object directions under analysis:

A new service	— 72.9%
A new technology	— 64.7%
A new product	— 63.8%
A new firm	— 52.0%
A new business	— 48.4%

In our respondents' opinion, regulation and stimulation of diffusion processes, apart from the measures that we have singled out, i.e. administrative, financial and technical support of RIS, can be executed with an attraction of a more copious range of methods (see table 2). First, we shall point out that in the further analysis and description of the research data alongside percentage distribution we shall employ regional population assessment indexes of "the innovations that have actually been implemented" according to the sectors* and other variables. The procedure of index transformation of ordinal scales was proposed by and used by N.I. Lapin in the research programme "Sociocultural development of the regions in Russia". Here we use his technique of data analysis, namely the methodological rule of a variable transformation (compression of the scale), in our case of the ordinal scale.**

Table 2

Index assessment of the measures that potentially promote intensive innovative development of the region

Types of support	The whole region		The Khanty-Mansyisk Autonomous District		The Yamalo-Nenets Autonomous District		The South of the Tyumen Region	
	Index	Grade	Index	Grade	Index	Grade	Index	Grade
Advisory and material support (business plan, leasing, credit, subsidies)	0.561	1	0.552	2	0.589	3	0.560	1
Tax benefits	0.559	2	0.577	1	0.571	4	0.535	2
Targeted programmes for small and medium sized businesses	0.496	3	0.518	3	0.557	5	0.452	3
Protection of commercial interests of innovators	0.476	4	0.479	4	0.606	1	0.426	4
Legal protection of innovative property	0.464	5	0.458	5	0.596	2	0.422	5
Development of small innovative business in non-primary sectors.	0.416	6	0.449	6	0.525	6	0.342	6
Shaping information environment (secial collections, magazines, publications)	0.341	7	0.354	7	0.397	7	0.308	7
The policy of import substitution	0.147	8	0.158	8	0.184	8	0.122	8

* Index is calculated as the ratio of positive and negative responses that are measured upon the ordinal scale without taking into consideration neutral responses and their absence, and then divided by 100. The limits of indices are from +1,0 up -1,0 which stand for maximum positive and maximum negative responses.

** The information was processed with the help of the 20th version of the *Statistical Package for the Social Sciences (*SPSS).

On the whole, according to the responses of the respondents, the table reflects a certain commonality in the demands of the corresponding RIS intensification measures in the regional subjects of the federation. The comparative value of indexes and grades of measures almost coincide. A small difference of grades is present at the Khanty-Mansyisk Autonomous District column where first place is taken by "tax benefits", unlike "advisory and material support" that keeps primacy for other subjects of the federation.

This ordinal structure of indexes that potentially promote for the intensive innovative development of the Tyumen Region enables to single out the two aggregate factors of RIS intensification:

(1) all sorts of material support and tax benefits— two indexes of 0.56 (that, in fact, is the same);

(2) development of small innovative business (three indexes with approximately equal density 0.496-0,464); its legal protection being accentuated (commercial interests of the authors and innovation property).

Somewhere lower, according to the index value, are the following necessary support measures: the development of small business in non-primary sectors of economy— 0.416 (though according to its content this index is close to the problem of small innovative business as a whole); Shaping information environment (secial collections, magazines, publications, special sites and data bases) — 0.341; the policy of import substitution — 0.147. It is quite obvious that in order to develop RIS, these factors are of principal importance. Even though some of them do not display high indexes, they, nevertheless, reflect the public opinion and the attitude towards innovations in the regional community.

CONCLUSION:

The analysis of innovation diffusion processes at the regional level, empirical data as well as statistic data of the process allows concluding that innovative activity and diffusion of innovations is executed and regulated by the regional administration centre. In this case the efficiency and perspectives of innovation process depend on the resources and energy provided by the centre as well as on its ability to generate and control direct and back communication of all RIS participants. It is universally acknowledged that many processes, generated both by nature and society, have their limits of possible changes due, above all, to the restriction of resources. Therefore, the shift from the stimulated type of development to the inherent type, based upon inner sociocultural engine of regional society as well upon expansive and borrowed types of social innovations, is a major administrative objective of RIS.

Hence, a demand rises for a synergetic approach that can unite efforts of every RIS participant, of the administration system, industrial sectors, education system, managers, and shareholders who are responsible for making joint decisions as to how to develop technologies of a concrete industry and business, and how to correlate the work of business and administration.

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