

# INNOVATION DEVELOPMENT

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## Strategic relationship between innovation development and management of human resources potential in the region



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**Abstract.** The modern concept for modernization of Russia's economy, put forward by the federal executive authorities, provides for an innovation development model. It is believed that only innovation is able to solve many problems that the Russian economy faces, and first of all, the enhancement of its competitiveness.

One of the problems of Russia's innovation system consists in the lack of resources and in their inefficient use in certain directions of development of innovation activity: outdated production capacities and facilities and equipment at research organizations; ageing of staff; limited access to financial resources. The availability and condition of these resources, the opportunities for their usage – in other words, the choice of innovation development strategy, all these factors determine the effectiveness of innovation activity in the region. The article provides a classification of the region's innovation strategies. Due to the fact that

the most important factor in achieving innovation economic development is the improvement of the quality of human resources, the authors highlight the issue of strategic compliance between the innovation development of the region and human resources management.

The authors define the strategy for innovative development of Krasnoyarsk Krai on the basis of the proposed methodology according to the methodology of strategic compliance; they also give recommendations on human resources management in the region.

The authors use analytical and statistical methods of research, and they take into consideration relevant scientific publications of domestic and foreign scientists. The research findings can be applied in the implementation of the concept for innovation development of the region.

**Key words:** innovation development, innovation strategy, innovation development strategy, human resources management strategy, strategic compliance, innovation economy, human resources potential.

Transformation of resource needs of the region's economy (production, financial, human and other resources) in its transition to innovation development necessitates the changes in established approaches to their reproduction. Traditionally, human potential is one of the most important resources for innovation development of economic system at any of its levels [17]; the condition of human resources primarily affects the extent and quality of research findings and scientific developments. Therefore, the formation of innovation economy requires selection of a particular development strategy taking into account specific requirements to human potential.

The aim of this study is to establish strategic correlation between innovation development of the region and human resources management.

For achieving this goal it is necessary to determine the type of innovation development strategy of the region on the basis of an integrated indicator for innovation growth, to establish the type of human

resources management strategy corresponding to the type of innovation development strategy, and to set out the strategic direction of formation of human resources potential in the region.

According to the definitions adopted in economic science, the strategy for the region's innovation development is understood as a system that comprises long-term goals and objectives aimed to promote innovation activity and increase the region's innovation potential, ways of using tools and resources for the development, implementation and dissemination of innovations and their implementation mechanisms [1, 2, 18, 19]. It should be noted that economic science, despite extensive research on the subject, has not developed a unified typology that would distinguish essential differences in the strategies for innovation development of regions. This can be explained by the fact that there are various research goals and foci, in particular: dependence on certain factors; composition of elements; structural transformation; economic mechanisms, etc.

In accordance with the purpose of this study, it is proposed to use the generalized change rate of indicators of science, technology and innovations that promote innovative activity in the region as the criteria for classification of innovation development strategy. This will help to distinguish three types of innovation strategies (growth, limited growth, reduction) using the classification of global development strategies proposed by American economists M. Mescon and F. Khedouri [16]:

- *growth strategy* is characterized by the annual increase in indicators of development of science, technology and innovation compared to the level of the previous year (fig. 1a):

$$X_j^{t+1} > X_j^t,$$

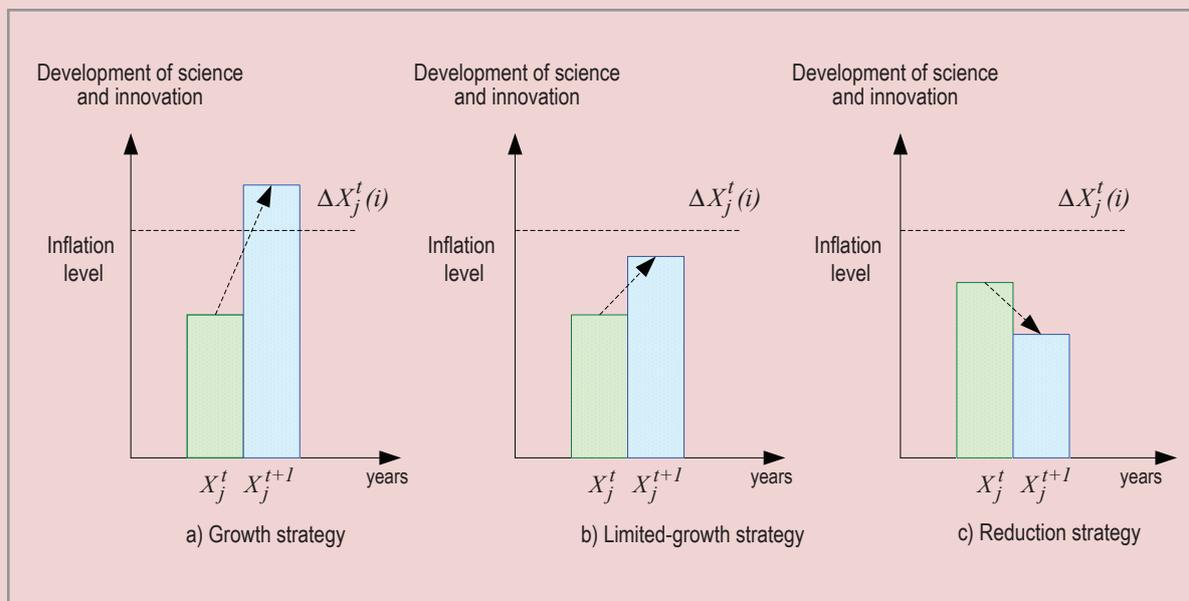
where  $X_j^t$  is the indicator ( $j$ ) that characterizes the development of science, technology or innovation in the period ( $t$ );  $X_j^{t+1}$  are the values of the same indices ( $j$ ) in the subsequent period ( $t+1$ );

- *limited-growth strategy* is characterized by the increase in the rates of development of science, technology or innovation compared to the previous period, but this increased does not exceed the value provided by the increase in the level of inflation (fig. 1b):

$$X_j^t < X_j^{t+1} \leq X_j^t + \Delta X_j^t(i),$$

where  $\Delta X_j^t(i)$  is the increase in the indicator of development of science, technology or innovation, caused by rising inflation ( $i$ ) in the period ( $t$ );

Figure 1. Innovation growth strategies



Source: compiled by the authors.

- *reduction strategy* is characterized by the reduction of the achieved level of the studied parameters in comparison with the previous period (*fig. 1c*):

$$X_{j+1} < X_j .$$

The system of indicators of the region's innovation activity was created taking into account world experience [4, 20], specifics of formation of innovation development potential in Russia's regions [21, 22], availability of statistical data necessary for the analysis. The system covers three groups of indicators.

*Indicators that reflect the status of human resources potential in the region for the development of science and innovation:*

- number of students of higher and secondary professional education institutions per 10,000 population – the feature characterizing the reserve of highly qualified specialists;

- number of personnel engaged in research and development – the feature characterizing the scale of employment in science and the potential for the increase of scientific knowledge and search for new spheres of its application;

- number of researchers with an academic degree – the feature characterizing the qualification of those engaged in research and development.

*Indicators of activity and innovation performance:*

- number of organizations engaged in scientific research and development;

- share of organizations engaged in technological, organizational or marketing innovation, the total number of organizations;

- number of implemented advanced production technologies;

- number of protected results of intellectual activity;

- volume of innovation goods, works and services;

- proportion of goods, works, and services produced in the region that have been newly introduced or have undergone significant technological change, in the total volume of shipped goods and performed works and services.

*Indicators of expenditure on technological innovation, scientific research and development:*

- proportion of expenditures on R&D in GRP characterizes the resources, equipment and funding of scientific research, the availability and renewal of equipment, the possibility of testing and implementation of research results in practice, the level of labor remuneration of personnel employed in R&D;

- share of extra-budgetary funds in R&D expenditures.

The type of innovation strategy in the region is determined in the following way: first, it is necessary to form statistical series of the data for each single indicator of the region's innovation activity; then – to calculate the indicators based on the ratio of the values of individual indicators at the end of the study period to their average value for the analyzed time interval; after that – to calculate the integral indicator of the region's innovation development ( $\alpha$ ) on the basis of the arithmetical average of the indices of single indicators.

The type of innovation development strategy is determined according to the following rule:

– if the value of the integral indicator is less than one ( $\alpha < 1.0$ ), then the type of regional innovation development strategy is *reduction*;

– if the value of the integral indicator has increased within the established inflation level ( $1.0 < \alpha < 1+i$ ), then the type of strategy is *limited growth*;

– if the value of the integral indicator is higher than in the previous years ( $\alpha > 1+i$ ), then the type of strategy is *growth*.

The results of calculations for Krasnoyarsk Krai based on statistical data for the five years from 2009 to 2013 are presented in the *table*. The calculations of the growth rates of individual indicators and integral index ( $\alpha = 1.3$ ) determined the type of innovation strategy – it is *limited growth*, because the value of the integral

Calculation of the integral indicator of innovation development of Krasnoyarsk Krai

Indicator	2009	2010	2011	2012	2013	Average value	2013/ average value
1. Number of students of higher and secondary professional education institutions per 10,000 population	620	601	557	557	847	636	1.33
2. Number of personnel engaged in research and development, persons	6299	6475	6748	6353	7273	6629	1.10
3. Number of researchers with an academic degree, persons	790	823	850	839	837	827	1.01
4. Number of organizations engaged in scientific research and development, units	52	54	53	52	52	52	0.99
5. Share of organizations engaged in technological, organizational or marketing innovation, the total number of organizations	12.2	10.0	10.2	9.5	11.2	10	1.05
6. Number of implemented advanced production technologies, units	1352	1937	1979	2261	2388	1983	1.20
7. Number of protected results of intellectual activity	561	518	474	529	499	516	0.97
8. Volume of innovation goods, works and services, million rubles	3 895	4 957	11 694	35 800	53 874	22 044	2.44
9. Proportion of goods, works, and services produced in the region that have been newly introduced or have undergone significant technological change, in the total volume of shipped goods and performed works and services	0.6	0.5	1.1	3.4	5.1	2.2	2.36
10. Internal expenditures on scientific research and development, million rubles	5572	6961	8908	10548	9736	8345	1.17
11. Share of extra-budgetary funds in R&D expenditures	58.3	77.3	106.9	45.3	42.1	65.9	0.64
Integral indicator ( $\alpha$ )							1.3
Compiled with the use of the following sources: Territorial Office of the Federal State Statistics Service in Krasnoyarsk Krai. Available at: <a href="http://www.krasstat.gks.ru">http://www.krasstat.gks.ru</a> .							

indicator does not exceed the official rate of inflation for 2013 (6.45%). A great part of examined indicators has positive dynamics; the indicators “the volume of innovation goods, works and services” and “the share of newly implemented goods or goods that have undergone substantial technological change” have the maximum effect on the integral indicator of regional innovation activity indicators. At the same time, the single indicators of the region’s innovation development have three indicators with negative dynamics, among them: “the number of organizations engaged in scientific research and development”, “the number protected results of intellectual activity”, “the share of extra-budgetary funds in R&D expenditures”.

Our calculations (see Table) show that the formation and development of innovation economy in the region depends largely on both direct (the first group of indicators – items 1–3) and indirect (performance indicators – items 7–9) influence of human resources potential. The contribution of these indicators to the integral indicator ( $\alpha$ ) of innovation development in Krasnoyarsk Krai is 64.7%. Thus, the research substantiates the importance of human resources management strategy for promoting innovation growth of the regional economic system.

At the same time, as the region’s economy is shifting toward innovation development, there emerge certain inter-related issues concerning human resources management.

First, due to these processes the economy *changes its internal needs* focused on

resource-efficient and innovation technology, which, in turn, necessitates a change in the *qualitative composition* (vocational qualification) of the region’s human resources.

Second, due to the *technological diversity* of the region’s economy there are segments that are currently at different stages of economic development and have different *different demands* for quality and composition of human resources.

Third, the *sectoral unevenness* of innovative activity makes it necessary to reproduce the personnel for *traditional* economic sectors in the region, and, at the same time, to form personnel potential of *the new quality* to satisfy the needs of innovation development.

Therefore, the specifics of innovation economic development in the region determine the formation and selection of different strategies of human resources management that are vertically integrated with the region’s development strategy and are its integral part [3]. Vertical integration is necessary to ensure consistency between the region’s development strategy and the strategy for the formation, use, and management of human resources in order to achieve synergistic effect of their interaction.

In accordance with the typology developed by Michael Armstrong we can distinguish three strategies of human resources management in the region [3]:

- resource-oriented strategy;
- strategy focused on achieving a high level of development;

– strategy for the formation of intellectual potential, focused on the high level of participation and commitment.

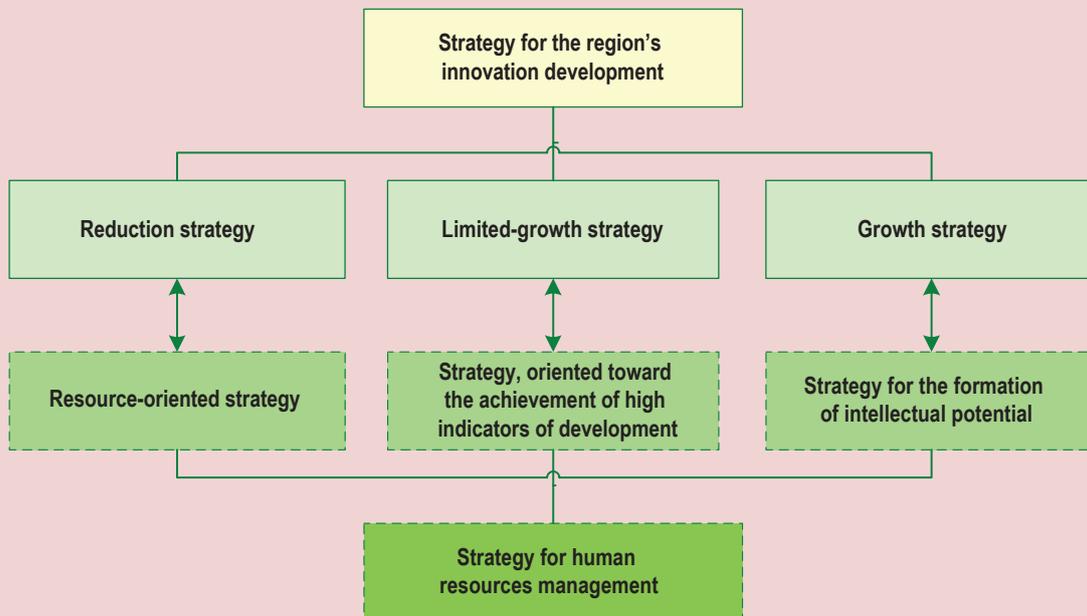
Let us establish a logical relationship between the strategies for innovation development in the region and human resources management in the region (fig. 2).

Due to the fact that *reduction strategy* is characterized by decline in innovation activity, economic development in the region is provided largely by socio-economic factors, therefore, the region’s human resources potential is characterized by stable professional-qualification structure (by levels, directions and qualifications of professional training), which is traditional for the region’s economy. In these conditions its strategy of human resources management

is focused on improving the efficiency of labor resources usage. The purpose of this strategy is to achieve strategic compliance of resources with favorable opportunities to obtain added value from their effective use. The *resource-oriented* type of strategy emphasizes direct correlation between the professional performance of personnel and the cost of enhancing the level of social and personal competencies (discipline, responsibility, diligence) and support of the required level of professional competence (education, qualification) [3].

*The strategy of limited growth*, being an intermediate stage in the transition to innovation development model, does not imply qualitative change in the structure of the region’s human resources

Figure 2. Strategic compliance of innovation development of the region’s economy with human resources management



Source: compiled by authors.

potential, while allowing for quantitative redistribution of labor resources between occupational groups (by level, direction and specialization of professional training). This strategy aims to increase the size of the economy in general, and ensure moderate rate of innovation and growth achieved through the development of programs for promoting and motivating labor resources in order to implement large-scale investment development projects and use new forms of employment (working on a rotational basis, part-time work, etc.), that directly affect the growth of productivity, quality of work and receipt of added value. The type of human resources management strategy *that is focused on the achievement of a high level of development* emphasizes the dependence of professional staff performance on the expansion of their range of competencies (professional, organizational, social, personal, etc.) [3].

*The strategy of innovation growth* of the economy is characterized by qualitative change in the demand for professional staff, which causes qualitative change in the structure (new levels of professional training, specialties, professions) of human resources potential in the region. *The formation of the intellectual potential in the region* is a type of strategy for management of professional staff, focused on achieving a high level of participation of professional staff in the development, implementation and dissemination of innovation (profound knowledge in the subject area, out-of-the-box thinking, ability to work not only within the team but also on one's own, commitment to lifelong learning,

professional development, willingness to accept innovation and change). This method of development makes it necessary to develop loyalty in professional staff not only through the high level trust and partnership relations with employers [3], but also through a sound regional policy of innovation development, which should have the following objectives [23]:

- decrease of uncertainty about the directions of innovation development in the region;
- promotion of active forms of cooperation between enterprises and universities, which can have a positive impact on the quality of intellectual potential;
- support (fiscal, resource, communication) to the development of innovation industries, creation of new jobs, retention of highly skilled employees and attraction of specialists from other regions.

Thus, according to R. Nelson and E. Phelps, the value of the region's human resources increases with the increase in innovative content of the tasks and technological changes [4, p. 69].

According to the results of calculation of the integral indicator of innovation development, the type of innovation growth strategy of Krasnoyarsk Krai is defined as *limited growth*.

According to the established strategic compliance, the most acceptable strategy for human resources management in the region is *the strategy focused on achieving the high level of development*. The main strategic directions of development of the region's personnel potential should comprise the following: development of

employment management programs in the region using forms of intra-regional mobility; improvement of the efficiency of professional training of personnel with an extended range of competencies (professional, organizational, social, personal, etc.) to meet the region's needs

of investment development; identification of the needs of innovation development of the economy in order to create programs for training highly skilled knowledge workers that possess fundamental knowledge, innovative thinking and creativity and are able to use modern technology efficiently.

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