

SOCIOLOGY OF INNOVATION

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UDC 31

PROFESSIONAL EDUCATION AND INNOVATIVE ACTIVITY OF POPULATION*

SUMMARY. In recent years almost all the subjects of the Russian Federation have formed regional innovation systems. In order to evaluate their effectiveness, it is important to monitor innovation activity of the population, to study the factors forming it. The study examined innovative activity of the population of the Tyumen Region in three subjects of the Russian Federation. The interest in the innovative development is mostly determined by professional education of a person. The majority of innovators have higher professional education. An important prerequisite of training new personnel for the innovation economy is constantly continuing training and education of the working population. In modern society, there is every reason to assert the need for additional continuous professional education of the working population. The amount of time spent on additional professional education per worker is the most objective measure of human resources formation for the benefit of innovation development. The manifestation of innovative activity of the population is also dependent on the electronic equipment of human life with the sources of information.

KEY WORDS. Regional innovation system, innovation activity, vocational training, continuous professional education, electronic equipment.

In recent years almost all the subjects of the Russian Federation have formed regional innovation systems. Comparing them, one can notice that many elements of these systems either duplicate one another or become notable by their innovativeness. First of all, it is typical of the regions with large metropolises, with high density of advanced technologies and academic science.

In order to assess efficiency of regional information system, it is important to monitor innovative activity of population, the degree of people's interest in innovations in different areas of social life, and their factual participation in innovative activity.

* This article was prepared with the support of the Presidential Grant of the Russian Federation "Scientific and pedagogical personnel of innovative Russia 2009-2013". (the research project "Design of a model and technology for indicative monitoring of innovative environment of the region", agreement No. 14.B37.21.0026).

The data gathered from the poll carried out by the all-Russian Center for Studies of Public Opinion (VTSIOM) testify that the percentage of people interested in achievements in science and technology has decreased over the last six years from 68% (2007) to 47% (2013). Simultaneously, the number of those not interested in attainments in the sphere of science and technology rose (28% six years ago versus 49% in 2013) [1].

The more important task is to investigate the factors that form innovative activity of population with the view to correct certain elements of regional system and to work out assessment criteria. Nowadays assessment criteria exist in the form of statistical measurements on whose basis complex indicators are worked out. However, to measure such a subtle matter as innovative activity of population, it is necessary to apply qualimetric methods that can be obtained exclusively in the course of sociological investigations. So far many peculiarities of innovativeness, social moods, motives and expectations of population are not taken into consideration either by researchers, or by authorities. This leads to the so-called “skidding” of innovative development processes, especially in the social sphere, and, as a result, to the loss of competitive ability, dynamics of socio-economic development of the region and country.

In the most trustworthy publication of the recent years concerning monitoring of innovative activity of population it is emphasized that “the role of sociological studies to assess the real state and level of innovative activity in the region has not been paid due attention to. This is not because sociologists underestimate the function of these studies, but because it is a subject for another study” [2]. In our investigation we have made an attempt to fill this gap.

The position of Russia in the majority of international innovative ratings is relatively low, and according to some indices, it is even decreasing. Thus, according to the results of Global Innovation Index (OH), in 2011 Russia took the 56th position among 125 countries. In accordance with the index of European Innovation Survey (E18), Russia has results three times lower than the average level of EU-27 countries [3].

Today the task to prevent Russia from lagging behind the developed countries in terms of the level of innovation is especially urgent. Political management of the country, first of all, activates the process of increasing the intellectual potential for stimulating innovative development of the country’s economy, thus increasing its level of its competitive ability. In this regard, we should assess the formation of the leading higher education institutions of the country; the creation of innovative centers; the regulatory acts that facilitate interaction between universities and industrial enterprises; the organization of economic societies by scientific and educational establishments for commercialization of intellectual achievements; the process of attraction of the leading native and foreign scholars to Russian institutions on the grant basis, and other measures.

In the context of the program for supporting small and medium innovative enterprises, the Russian Federation Ministry of Economic Development implements co-financing of regional centers of cluster development, collective access to highly technological equipment, scientific devices in innovative business incubators. In

accordance with the initiative of the Federal government, technoparks, special economic zones of implementable type, and nanotechnological centers are created. The Skolkovo Innovation Center is being formed. The status of its residents can be provided to innovative companies from different regions of the country.

Yet, even large-scale measures do not always show immediate results. Like in many other multifactor processes, the retarding effect takes place. In this case, the innovative policy of regional authorities is of importance, for it is closer to the people, and the retarding effect from the measures taken and innovative investments is supposed to be less.

The main factor in innovative activity is human resources, people who generate new ideas and inventions, introduce and effectively utilize them. In the contemporary world competition for high-quality human resources is becoming more critical. This competition for minds and intellect takes place not only between countries, but within almost every country – between capitals of countries and their periphery. In this sense the indicators of social mobility, migration of population appear to be significant, for people transfer new ideas and technologies. It is important to understand the qualitative aspect of migration of population in terms of its level of education and professional training. There is a danger that capital centers, due to a wide range of their competitive advantages, attract highly intellectual resources of the country, but they do not always rationally manage this most valuable capital.

The “Innovative Russia-2020” strategic document points out the necessity of elaborating regional strategies of innovative development [4]. When working out long-term programs of innovative development at the regional level, it is important to avoid such a methodological mistake as underestimating the significance of human factor, social capital, and intellectual resource. Taking into account the visible tendency when the level of replenishment of the country’s working potential decreases to one million people per year, it is possible to develop the country’s economy and social sphere only by means of increasing the quality of labour resources. Investments in human resources, their qualifications, and regular increase in their professional level are becoming the main source of economic and social progress of the country.

It is important to pay special attention to this strategic peculiarity of Russia’s development because of the fact that in the majority of methods suggested by Russian scholars concerning assessment of innovative development, in the measured innovative processes not more than 20% refer to the human factor. For example, in American methods this index is at the level of 30%, and the index of human welfare, which with a certain degree of conventionality can also be referred to the human factor, is 10% [5]. At first sight, it is not that fundamental. But such underestimation of the significance of human capital makes it possible to justify understatement of the amount of resources that are directed to this sector of social development, with all the ensuing consequences. It is known that almost all the so-called new industrial “tigers” of the Asia-Pacific Region began their breakthrough in innovation from a significant increase in investments in human capital, intellectual resources, and organization of their economic and social life.

Moreover, it is necessary to take into consideration the point that if the newest technologies can be imported, it is not that easy to attract a significant amount of human resources from abroad. These resources are supposed to be formed from the present population and labour resources. That is why the human factor must become the main concern of regional authorities and business communities. So far in the majority of investment projects, proper recruitment of personnel is either not at all taken into account or carried out formally, and in business-plans it does not entail significant financial contributions. In particular, many experts note that in Russian conditions the newest imported equipment does not give those technical-economical results that are stated in technical documentation.

Lately it has been observed that the gap between the level of professional qualifications of population and the needs of innovative development tends to grow. From 2007 to 2011, the number of organizations with underqualified personnel, considered by experts as one of the factors restraining innovative development of an enterprise, increased from 192 to 419, i.e. more than twice. This is even more than the impact of such factors as high costs of innovations, lack of financial resources, lack of support from authorities, insufficiency of legislative and regulatory documents that set and stimulate innovative activity [6].

The report of a working group, prepared for the sitting of the Russian Federation State Council, shows that social and administrative factors have a lesser priority in comparison to economical and technological ones [7].

From the methodological perspective it is completely wrong. The problems of implementing innovative programs which help increase innovational activity of population are to a significant extent connected with social factors, especially with innovative activity of population.

In our research we investigated innovative activity of the population of the Tyumen Region which consists of three sub-regions. According to statistics, one-third of those asked: "Do you take interest in innovations and innovative development?" responded affirmatively and only 15.5% stated a complete absence of interest in this issue*. The respondents were also asked to point out those spheres of social life in which they had come across innovations. Here, it is possible to clearly see the line between different spheres of social life, since in different branches more than a half of the respondents pointed out these innovations. The branches are education (63.5%), the system of electronic service (59.6%), banking and financial service. This level can be considered quite high. The medium level can characterize those spheres where 30-50% of people asked dealt with efficient innovations. Those groups in which less than a third of the respondents noted efficient innovations should be referred to a group with a low level of innovative development (here are the sphere of employment, consumer services, municipal administration, regional administration, ecology and nature protection, and road construction)**.

* The processing of information was carried out with the help of the 20th version of SPSS.

** In 2013, in the course of sociological research, various methods of sociological analysis of innovative activity of people were applied: 8 focus-groups were surveyed, content analysis of different types of

In traditional methods, among the indices that determine the level of human capital development there are “students studying at institutions of higher professional education per 10,000 people” and “the population with higher education in relation to the total amount of a region’s population of working age”.

These most significant innovation factors are formed during quite a long period of time. Training of one specialist requires 4-6 years of professional training at university, and training of a researcher takes 10 years. Moreover, it should be taken into account that according to objective reasons in Russian universities there has been a decrease in the quality of academic and professional training, and a considerable shift has occurred towards part-time and distance learning. Only a third of post-graduates manage to complete their dissertational research in time. It is considered normal when they defend their theses during the first year after graduation. There are no clear criteria of assessing the process of re-training and advancing professional skills of the working population.

All these outlined tendencies are practically not taken into consideration when forming the index of human capital. There are no decreasing coefficients that would provide a more objective picture of intellectual capital formation for innovative development.

The interest in innovations and innovative development, first and foremost, depends on professional education of a person. Definitely it is possible to conclude that the more advanced education a person has, the more interest he or she takes in innovative development. This point is revealed in the measurements we made in a large-scale sociological survey among the population of the Tyumen Region, the Khanty-Mansysk Autonomous District and the Yamal-Nenets Autonomous District (Table 1).

*Table 1***Interest in innovations**

Education	Interest in innovations		
	Great interest	Little interest	No interest
Incomplete secondary education	17.0	44.7	27.7
General secondary education	27.0	42.9	19.0
Specialized secondary education	20.2	47.0	16.7
Higher education	39.2	38.5	11.4
Academic degree	64.3	21.4	7.1

A quick growth of interest in innovations and innovative development is observed in people who have higher education (almost 40% are very interested in this matter) and in specialists with academic degrees (25%). A decrease in interest

media – 4 newspapers, 1 journal, 2 Internet sources – was conducted, 118 experts filled questionnaires, 1,661 people filled population survey questionnaires. Such factors as sex, age and level of education were taken into account.

in innovations can be noticed in the group of population who received only secondary education.

When estimating a common interest of all the respondents in innovations and innovative development, it is important to consider their factual participation in innovative activity. Among those who expressed great interest in the issue of innovative development, only a third take part in the activity of this kind, and this index varies from 11.4 to 12.8% for all the three subjects of the Russian Federation with the average ratio of 11.8. A conclusion arises that there is a large discrepancy between a person's interest in innovations and his or her real participation in innovative activity. In this case, it is important to know about the factors that restrain this process.

Personal involvement of the respondents in innovative activity on the level of regional community considerably increases when there is a developed material and technical production base, social infrastructure as a whole and especially – regional innovation environment.

Personal part in innovative activity also directly depends on the level of education of working population (Table 2). We have already mentioned that only 11.8% of the respondents mentioned actual involvement in innovative activity. This involvement also directly depends on the level of education.

The majority of innovators have university degrees.

Table 2

**Personal participation in innovative activity depending
on the level of education**

Education	Personal participation in innovative activity		
	Yes %	No %	No response %
Incomplete secondary education	8.5	91.5	-
General secondary education	8.7	87.7	3.6
Specialized secondary education	7.2	89.1	3.6
Higher education	17.8	80.8	1.4
Academic degree	35.7	64.3	1.4

The hypothesis of our research presupposed that investments in the sphere of professional education are most efficient and cause the quickest results in terms of growth of innovative activity of population and especially – the growth of additional professional education.

Information about modes of getting basic professional education, and the way intellectual potential of the region forms is of interest. The main means of organizing professional personnel is the system of professional education. In the case with male population, the first position is taken by primary and second professional education – 32.1%, with female population, it is institutions of higher education – 39.4%. Among men a considerable part – 11.2% – received professional training in military service. It is essential to note that one-fifth of the population obtained professional training directly at their workplace, and regarding women, this index is higher – 23.9%. Taking

into account this peculiarity of basic professional education and training formation, one can come to the conclusion that the system of additional professional education gains more and more popularity.

One of important factors of developing human resources for innovation economy is retraining and professional improvement of working population who already have secondary and higher education. Nowadays practically everyone understands the importance of continuing professional education. In order to receive additional education, professionals use not only their free time, but also part of their working time. For innovative development of the city, region, country, the amount of investments in APE (additional professional education) and a specific weight of these costs in educational budgets are considerable and, moreover, investments in this sphere are characterized by higher economic and social efficiency and a faster economic payoff than investments in basic professional education. However, APE in the context of market reforms in Russia appears to be disorganized: proper indices for its measurement are not worked out, and there are no sufficient statistical data, for statistical measurements are carried out only once in two years.

For a more exact evaluation of APE's impact on formation of human capital ready to contribute to innovative development, annual measurements are necessary. These measurements can include, for example, the amount of time, working days and hours spent on retraining and professional improvement per year per employee. The level of financial expenses for these aims does not provide an objective view. A training period of a top-manager abroad exceeds costs for retraining of dozens and even hundreds of people. It is necessary to clarify what parameters are employed in the regional statistics, foreign statistics, and what new and original measures we can suggest. Mainly this became the result of our research, which was financed by the granting program.

It is worth paying attention to the distribution of responses in different demographical groups of population. Certainly, groups differ in their interests and values they have developed, in education they have and social strata they belong to. Relatively young groups are most of all involved in APE, and this situation is justified by the level of interest in innovations and participation in innovative activity.

We also made an attempt to evaluate people's interest in innovations, especially those people who had undergone professional training in various forms and at different periods. So, great interest in innovations is observed in 41.4% of the respondents who have undergone professional training over the last five years. Among those who went through professional training 5-10 years ago, high interest in innovations is stated by 10% of the respondents, i.e. four times less; and 1.6% is in the case with more than 15 years without retraining. This survey allows drawing a conclusion that the system of retraining and qualification improvement is oriented towards innovative education and renewal of professional knowledge of working population more than higher education due to its flexibility, efficiency and short term nature. Consequently, the first recommendation for the authorities is to change state and municipal budgets for the benefit of continuing professional education,

i.e. for the benefit of all forms of retraining and qualification improvement. This will efficiently contribute to the formation of innovation capital. At present, this system is more or less organized for the officials of state and municipal service, scientific and pedagogical personnel, healthcare workers, top managers of large enterprises and for several other categories.

The main problem is that in the Russian Federation, unlike in countries advanced in innovations, educational budgets of all levels are directed to professional education institutions that provide basic education for young people. But before forming a complete and renewed system of retraining and professional improvement of population occupied in economic and social sphere, we need to work out and test the system of indices for monitoring these processes. Here the frequency with which one receives APE, the annual number of working days and hours spent on professional improvement, the amount of financial resources directed to these goals should be taken into account.

Dynamics of interest in innovations noted in different population groups also depend on the education level of the respondents. And it should be noted that youth groups originally have a higher level of general and professional education, and this situation certainly impacts the formation of interest in innovations.

The greatest interest in innovations is observed in the population group aged from 18 to 30 – 34.8%. And in the following age groups a gradual decrease in such interest is observed: the group aged from 31 to 40 – 31.7%, the group aged from 41 to 50 – 28.3%, the group aged from 51 and older – 25.5%. It is interesting to note that if in the age group from 18 to 30 only 12.0% of the respondents stated that they had no interest in innovations, in the older age group the negative response was chosen by a quarter of the interviewed, which is twice as much as in the previous group; and 18.3% refused to give any definite answer.

Manifestation of innovative activity of population directly depends not only on the level of general and professional education, but also on electronic and informational provision of population, on sources from which people acquire information in their everyday life. This is the question of self-education. Through processing the information from responses to the question: “What kind of technical novelties and devices are most important in your everyday life?” it became possible to estimate a person’s level of innovative competence which determines his or her innovative behaviour not only in their personal life, but also in the industrial and social activity. One can give a number of examples of ordinary people using the Internet for fighting drug addiction, pedophilia, and other criminal manifestations, or for organization of socially important activities (volunteer movements, assistance to veterans, etc.). And very important is the fact that these activities are often organized “from below” – they are initiatives of civil society.

That is why in our research we put forward the hypothesis that the level of electronic equipment of a person has a direct bearing on all spheres of his/her life: personal, social, industrial. First of all, we will illustrate the ranking of importance of such novelties in daily life of population and compare it to the

obtained data concerning people's interest in innovations and innovative development (Table 3).

Table 3

What technical novelties and gadgets do you consider the most important (useful) in your everyday life?

Novelty	Affirmative response %	Rank position
Cellular communication	86.8	2
The Internet	88.6	1
Digital TV	35.4	5
Tablet computers	25.8	7
Colour printers	12.1	10
Bank cards	65.8	3
Payment of taxes and public services with bank cards and terminals	41.0	4
Water filters	33.2	6
Request for certificates via electronic databases	19.9	8
Purchasing via the Internet	19.3	9
Other	0.4	11

A high level of distribution of technical novelties among population of the region shows quite a high level of population's electronic and informational competence, shapes a good basis for self-education, for acquisition of new professional knowledge and, consequently, increases the level of innovative behaviour. These results also require trustworthy and easily estimated indicators for monitoring. In our research Tyumen respondents equipped with different kinds of gadgets are distributed in the following way: one gadget is owned by 42.7% of the respondents, 2 gadgets – by 22.7%, 3 gadgets – by 17.7%, 4 gadgets – by 10%, 5 gadgets – by 4.5%, approximately 1% of Tyumen citizens have more than 5 gadgets. Now it is not difficult to analyze the connection between owning and using a gadget and expressing interest in innovations and innovative development. We have a good reason to believe that the more comfortable with technological innovations people are, the higher is their interest in innovative development.

It is possible to assume that a person's dependence on electronic equipment and information technology changes their selection of sources of information: one can observe a transition from traditional sources of information to new ones, such as online magazines, newspapers, blogs, forums etc. This information is of special interest to us, since the level of electronic equipment of population and its dynamics are noticeable not only in mass polls, but also in different data of regular statistical observations made by bodies of State Statistics. This allows constructing indicators of innovative activity, innovative behaviour of the region's population for the system

of monitoring (for example, the dynamics and amount of purchases of different technical novelties).

It is also significant to analyze the connection and interdependence between electronic and informational provision of population and their real participation in innovative activity. It is possible to assume that the form of people's participation in innovative activity is greatly dependent on electronic equipment in their everyday life. The higher the electronic equipment and information technologies culture are, the higher is the level of a person's needs in his/her workplace and the higher is his/her interest in different kinds of innovations.

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