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Assessing Innovation Susceptibility of Regions And Municipal Districts

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Abstract

Innovation activity is now acknowledged as the basis for successful development. However, many industries, regions and countries have got bitter experience of creating innovative clusters and encouraging innovative activity. Many attempts failed in spite of seemingly favourable conditions and factors for successful innovations in these areas. This is true for the regions of Russia as well. The immediate aim of the present study was to identify those areas (municipalities) of Perm Kray that possess high innovation susceptibility in terms of new developments and creation of innovative cluster.

1. Introduction

Innovation can be defined as a marketable new development applied in practice that provides a qualitative increase in efficiency of production processes, management, wealth creation, as well as improvement of living standards (living, working, recreation conditions).

As for the term "susceptibility", it is more commonly used in social, philosophical, philological, psychological, exact sciences and generally means "ability to perceive, distinguish and assimilate phenomena of the outside world."

Innovation susceptibility covers a number of socio-economic and psychological factors that, to a certain extent, determine innovative activities success. It is a property of susceptibility that allows entities to perform innovative activities efficiently, implementing novelties of all sorts.

Scientific approach to the study of any socio-economic phenomenon involves theoretical understanding of its core and its assessment.

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2. Theoretical background

2.1. The definition of innovation susceptibility

The study of Russian scientific economic literature on innovation susceptibility showed poor theoretical interpretation of this term. All in all, it is possible to find just a few definitions of innovation at the enterprise level (the largest number among all), as well as some definitions only of innovation susceptibility of a country (national economy) and regions (Monastyrny, 2008). Maslennikova N.P. determines the enterprise innovation susceptibility as the organization's ability to discover innovations in the information field, to distinguish and identify their individual features, highlight their informative content, that corresponds the goal of action, the formed image of the enterprise development and to apply innovation in order to increase their competitiveness and as the process of innovation assessment, the initiation of its adoption, implementation and routinization (the change of innovation into common thing, characterized by predictability of workers behaviour and repetitive activity patterns) (Maslennikova, 2010). Vladimirova O.V. understands the regional innovation susceptibility as the Availability and ability of regional units and executive agencies to create and implement innovative processes based on existing conditions and resources within a particular and ongoing regional innovation policy (Vladimirova, 2010a).

At the same time, the analysis of literature made it possible to reveal that scientific usage of the term innovation susceptibility of municipal districts doesn't exist. Accordingly, there are no techniques to estimate municipal districts susceptibility. Therefore, for our study to measure the level of innovation susceptibility and to construct municipal districts innovation susceptibility map the definition of regional innovation susceptibility was used. This is justified by the fact that it is the most relevant for the subject of investigation – territorial and administrative units.

2.2. The assessment of innovation susceptibility

The study of the Russian scientific sources showed several approaches to assessment of the regional innovation susceptibility (Evseev & Bezglasnaya, 2009; Gusev, 2009; Grodskaya, 2008; Maslennikova, 2010; Shamlikashvili, 2010; Vladimirova, 2010b). Most of them consider innovation susceptibility as a constituent of an overall assessment of the economic unit (form, region, country) competitiveness, or use it to construct the rankings of the unit innovative activity as an intermediate indicator of general calculations. Such assessments require using appropriate statistical data reflecting the development level of engineering capability for production development, personnel skills, the level of technological novelty of the product, the motivation for innovation, etc.

However, such methods can be hardly involved in the present analysis since they are limited to either: 1) economic resources and conditions that foster innovation, or 2) ability of districts and executive authorities to create these processes.

3. The method

In this paper the method suggested by A.B. Gusev to construct the rankings of innovative development for the Russian regions was used (Gusev, 2009). A.B. Gusev suggested a set of parameters that determine the level of innovation development of regions and are mirrored in government statistics, i.e. such parameters that can be calculated based on the official statistics information. All parameters listed in ranking are divided in two groups: factors that describe the level of regional innovation susceptibility (innovation susceptibility factors) and parameters of innovation activity in the region.

The first group of factors includes the main indicators of the regional economy technological efficiency: capital productivity, labour productivity and ecological compatibility. The list of technical indicators could be supplemented by energy consumption parameter of the regional (municipal) economy, but there is currently no appropriate official statistics.

In accordance with the chosen method, labour productivity, as imposed by the inquiry subject, was calculated as a ratio of gross municipal product (GMP) of the municipal districts to the mean annual number of people employed in that municipal district:

$$d = Y / L \qquad (1)$$

where d is the municipal district labour productivity; Y is the gross municipal product of the given municipal district; L is the mean annual number of the municipal district employees.

Capital productivity was calculated as a ratio of the municipal district's GMP to the value of fixed assets owned by enterprises and organisations of that municipal district:

$$f = Y / F \qquad (2)$$

where f is the capital productivity of the municipal district economy; Y is the municipal district's gross municipal product; F is the value of the municipal district's fixed assets.

Ecological compatibility of production is the quotient of the division of the municipal district's GMP by the total volume of pollutants discharged into atmosphere:

$$e = Y / E \qquad (3)$$

where e is the municipal district's ecological compatibility; Y is the municipal district's gross municipal product; E is the total volume of pollutants released by the municipal district's stationary sources.

In order to calculate the above parameters the 2009 official statistics for 40 municipal districts of Perm Kray was taken. Then a rating and map of Perm Kray innovation susceptibility were designed.

An overall rating procedure consisted of certain steps as follows:

1) Calculation of the actual values of the labour productivity, capital productivity and ecological compatibility, based on municipal statistics.

2) Calculation of the highest and lowest values for each criterion among the areas studied.

3) Valuation of the values of the labour productivity and capital productivity:

$$Y_{norm} = (Y_i - Y_{min}) / (Y_{max} - Y_{min}) \qquad (4)$$

Valuation of the environmental condition of the municipal district was calculated as follows:

$$Y_{norm} = (Y_{max} - Y_i) / (Y_{max} - Y_{min}) \qquad (5)$$

4) For each criteria group and for each municipal district calculation is made of the parameter showing development level of the subject area for a given municipal district.

$$Y_{group} = \frac{\sum_i^N Y_{norm}^i}{N} \qquad (6)$$

where N is the number of criteria in a group.

5) For each municipal district is made calculation of a total value of all criteria as integral parameter (index) of the municipal district's innovation susceptibility:

$$Y_{integ} = \frac{\sum Y_{norm}}{3} \qquad (7)$$

where $Y_{integ.}$ is the integral index for each municipal district; Y_{norm} is the normalized value of such criteria as labour productivity, capital productivity and ecological compatibility for each municipal district; 3 is the number of criteria.

6) To create a final rating and map of innovation susceptibility an integrated value was calculated. For this purpose each municipal district was given an individual score judging by the index. The score 100 was given to the leader, i.e. the municipal district having the highest index. The score for all others was calculated as proportionate share of the leading municipal district rating. Following this assessment, a map of the Perm Kray innovation susceptibility was built.

Mapping was performed on the basis of the following formula:

$$b = \frac{X\ max - X\ min}{1 + 3{,}222 * lgn} \qquad (8)$$

where *k = 1+3,222 lgn; k* is the number of grades; b is the grade size; *n* is the number of observations in the sample; *lg n* is the decimal logarithm; X_{max} is the highest and X_{min} the lowest values in the sample.

The number of observations in the sample is 40, decimal logarithm equals 1.602, the number of grades is 6.8 = 7. The following grades are obtained as a result (see Table 1).

Table 1. The following grades

The number of grades	Size gradations
1	97,3885-113,5266
2	81,2503-97,3884
3	65,1121-81,2502
4	48,9739-65,1120
5	32,8357-48,9738
6	16,6975-32,8356
7	0,5593-16,6974

Two colors are used for mapping, the dark grey marking the highest value, the light grey the lowest.

All municipal districts of Perm Kray (Perm region)were indexed from 1 to 40. The indexes were used for further mapping. A map of innovation susceptibility is given in Fig 1.
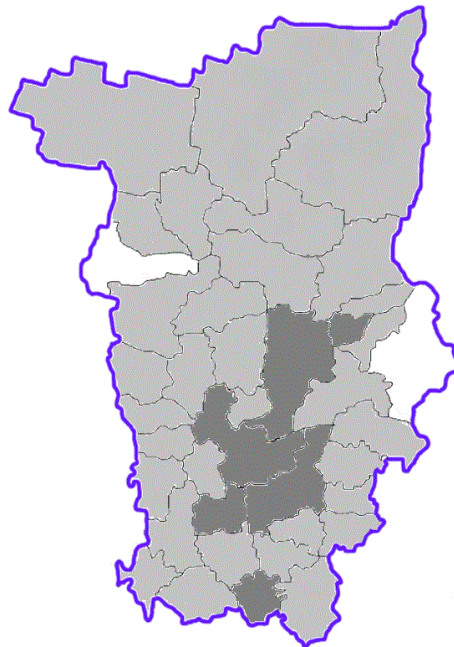

Fig. 1. The map of innovation susceptibility of municipal districts of Perm Kray

4. Conclusions

The analysis showed that six municipal districts of Perm region (Perm Kray) have the best innovation susceptibility. All other municipal districts of Perm Kray have an index below 50 and, thus, do not demonstrate a sufficient level of innovation susceptibility.

It is worth mentioning that all areas of high innovation susceptibility are located side by side in the south-eastern part of Perm Kray and share borders. This testifies to the fact that the conditions for successful innovative activity within certain territory are formed in Perm Kray. This territory is smaller than the region but larger than a single municipal district. Such an administrative and geographic location grants a number of advantages to the municipal districts, including creation of specific centres of innovative activity intensification, concentration of innovative enterprises and research centres in that area and so on. A relatively small territory can be managed in a more efficient way. At the same time, multiple and rich natural, production and human resources provide various opportunities for further area development.

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