Financial, Institutional and Personnel Threats to Innovative Development of the Region

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Abstract. Purpose – revealing and summarizing the opinions of experts representing regional authorities and business structures regarding threats to the development of an innovative economy. Research methods: expert assessment of threats to the development of an innovative economy. For processing and summarizing data, fuzzy logic methods are used. Results. Among the threats that could have a negative impact on the development of innovative economy, there are none that are rated as “very high” by both groups of experts. All threats related to financing were highly appreciated by business representatives. The authorities are more optimistic about this group of threats, only five out of eight are rated as “high” in terms of a general indicator that reflects the strength of influence and the likelihood of implementation. The highest, in their opinion, is the threat of a low level of budget financing of science and higher education. In the group of institutional conditions, according to entrepreneurs, the highest threats are related to the lack of state support for joint projects of universities and enterprises to create high-tech industries and insufficient protection of intellectual property. According to representatives of the authorities, these threats are of medium importance. Personnel threats are few, but rated by both groups of experts as very high or high.

1. Introduction

Innovation processes in the Russian regions are developing at a pace that is not adequate to the needs of the modern economy of the regions [1, 2]. Re-searchers pay great attention to the study of conditions and factors determining the nature and dynamics of innovative processes [3, 4, and 5]. Currently, there are practically no outstanding problems associated with the technical and technological aspects of the innovative development of socio-economic systems of various levels. The financial aspects of ensuring the innovative development of enterprises, regions, and macro-level systems have been studied fairly well (the problem is the search for its sources in practice and methods for stimulating investors). Contradictory institutional factors have been much less studied; their quantitative measurement is still more experimental than systemic in nature [6, 7, and 8].

2. Methodology

The basic research method - experts. The questionnaire was developed by the expert community as part of the faculty of universities and employees of regional authorities. The expert survey involved four groups of experts: the faculty of several universities in Bryansk, Voronezh, Krasnodar, Kursk, Orel, Tambov; employees of the authorities of the Voronezh region; business representatives and
management of banks in the specified region. This article presents the positions of experts of two groups: authorities (20 experts) and business structures (31 experts).

The authors did not envisage combining threats into groups at the questioning stage, so as not to involuntarily influence the opinions of experts. When processing data as a part of threats, with some degree of conditionality, three groups are identified: financing (forms, volumes, sources); formal and in-formal institutional conditions; frames.

The “financing” group includes the following threats (numbering is made for compact presentation of the data processing results in a tabular form): low budget financing of academic science and higher education (1), the lack of necessary funds for commercial organizations in the real sector of the economy to finance development and implementation of technological projects and product innovations (2), the lack of sufficient incentives for banks for long-term lending to innovative activities of organizations in the real sector of the economy (3), the absence of tax benefits and other preferences for clusters and technology parks engaged in innovative activities (4), the absence of tax benefits and other preferences for high-tech entrepreneurship (5), the lack of a venture investment market (6), high inflation (7), the volatility of the foreign exchange market and, as a result, the cost of imported equipment and components (8).

Institutional conditions: reduced incentives for the creation and implementation of innovations in connection with the monopolization and nationalization of the economy (9), deterioration of the overall institutional environment in Russia (10), barriers to the inclusion of Russian innovative companies in international production cooperation (11), lack of state support for joint projects of universities and industrial partners to create high-tech industries (12), lack of the necessary legal framework to protect owners of intellectual property results (13), external sanctions blocking the transfer of new technologies developed in foreign countries to Russian companies (14), low level of innovative culture population (15), the low level of business susceptibility to innovation (16), the lack of the necessary relationship between subsystems and individual elements within the region's innovation system (17).

Staffing problems; the backlog of higher education in training personnel with competencies adequate to the requirements of an innovative economy (18), the “Brain Drain” of existing and potential developers of technological and product innovations (19).

Threats were assessed on a five-point scale: if the strength of the threat is the most significant, a rating of “5” is set, moderately significant - “4”, insignificant - “3”, extremely insignificant - “2”; if the probability of the threat is very high - “5”, high - “4”, medium - “3”, low - “2”. We draw attention to the fact that in assessing the probability the traditional scale from 0.0 to 1.0 was not used, since it (probability) has a different meaning here. The traditional scale is used for repeated identical phenomena, in our case there is neither repeatability nor uniformity of events, therefore only their predicted qualitative state is evaluated. In this case, it is more convenient to use a five-point scale that is understandable to any expert. In addition, at the same time, estimates of the results according to the strength of influence and probability become compatible, which allows one to obtain a generalized indicator for each threat, taking into account both the strength of its influence and the probability of occurrence, based on the principle of non-discrimination.

Data processing was carried out using fuzzy logic according to the methodology of L. Konysheva, D. Nazarov [9]. Previously, this method was used by the authors of this article and other researchers to analyze various socio-economic processes. The values of the fuzzy indices presented in the table are interpreted by the authors as follows: less than 0.1 - high consistency of expert opinions, more than 0.1 - low consistency. A more detailed assessment of the index in this case is not required, since almost all of its values are less than 0.1, which indicates a high consistency of opinions of experts in general.

The general indicator was calculated according to the formula presented in the works of D. Endovitsky, A. Pugatyreva, I. Risin, M. Tabachnikova, Yu. Treshevsky, G. Franovskaya, Y. Vertakova [10, 11, 12 and 13]. The interpretation of the values of the generalizing indicator is as follows: more than 20.0 - a very high value, 15.0-19.9 - high, 12.0-14.9 - medium, less than 12.0 - low. The maximum possible value of the generalizing indicator is 25.0 (the case when both the power of influence and the likelihood of the threat are realized, all experts rated 5 points).
3. Results and discussion
The results of the threat assessment for the development of the innovative economy of the “financing” group by business representatives are presented in Table 1.

Based on the data in Table 1, it can be argued that the “business” generally appreciates the impact of this group of threats on the development of the digital economy in the region both in terms of the strength of the influence of opportunities and the likelihood of their realization (on average 4.39 and 4.05, respectively). Moreover, the consensus of experts is high (the maximum fuzziness index does not exceed 0.09), but in some cases there is a noticeable difference between the indices. For example, the greatest consistency is observed under the threat of “lack of a venture investment market”, and the least - “low level of budget funding for academic science and higher education”.

Table 1. Threat assessment of the “financing” group for the development of an innovative economy by “business”.

| Threats | Averages | Indistinct indices | Summary indicator |
|---------|----------|--------------------|-------------------|
|         | The probability of the threat | Threat power | The probability of the threat | Threat power |
| 1       | 4.03     | 4.45               | 0.09              | 0.08            | 17.83           |
| 2       | 4.16     | 4.61               | 0.07              | 0.05            | 19.13           |
| 3       | 4.35     | 4.58               | 0.02              | 0.06            | 19.92           |
| 4       | 3.74     | 4.42               | 0.04              | 0.07            | 16.49           |
| 5       | 3.97     | 4.10               | 0.01              | 0.09            | 16.24           |
| 6       | 4.00     | 4.39               | 0.04              | 0.02            | 17.53           |
| 7       | 4.13     | 4.45               | 0.05              | 0.01            | 18.37           |
| 8       | 4.03     | 4.10               | 0.04              | 0.04            | 16.49           |

None of the threats received the status of “very high” by the value of the generalizing indicator. The threat “the lack of sufficient incentives for long-term lending to innovative activities of organizations of the real sector of the economy” received the highest rating (general indicator 19.92). This is due to the fact that both the probability of implementation and the strength of the influence of this threat are considered significant, and there is a high degree of agreement among experts. The second and third positions in terms of impact on innovation processes are occupied by the “lack of necessary funds for commercial organizations in the real sector of the economy to finance projects for the development and implementation of technological and product innovations” and “high inflation”.

The lowest rating was “the absence of tax benefits and other preferences for high-tech entrepreneurship” (general indicator 16.24).

It is noteworthy that all the opportunities were rated higher in terms of degree of influence than in probability of implementation. The largest gap is observed in assessments of the strength of influence and the likelihood of realization of the threat “lack of tax benefits and other preferences for clusters and technology parks engaged in innovative activities” - 0.68 points. The least threat is “the volatility of the foreign exchange market and, as a consequence, the cost of imported equipment and components” - 0.06 points.

Table 2 summarizes the assessment by government officials of financing threats.

The basic research method - experts. The questionnaire was developed by the expert community as part of the faculty of universities and employees of regional authorities. The expert survey involved “Authorities” evaluate financial threats by the strength of influence and probability of implementation lower than “business” (average generalizing indicator 15.49), which slightly exceeds the “average” level.

The maximum rating was received by the “low level of budget financing of academic science and higher education” (18.0). The assessment of the likelihood of its implementation in comparison with the power of influence is significantly lower (a gap of 0.91 points). The “volatility of the foreign exchange market” is slightly lower. In general, most of the threats are rated as “high” by a general indicator.
The “average” rating was “the lack of tax benefits and other preferences” for innovative infrastructure facilities (clusters, technology parks, etc.) and the “lack of a venture investment market”.

In general, the threat of a lack of tax and other preferences for high-tech entrepreneurship is low. Interestingly, in the assessments of entrepreneurs, this is also the least significant threat. Such a solidarity of experts representing different institutional structures is rather strange, since in general in the world, including domestic literature, the importance of various kinds of financial preferences for high-tech business is assessed as a very significant factor in innovative development. Even more interesting, the power of influence of this threat is estimated to be much higher than the probability of its implementation. Based on this assessment, it can be assumed that the country has sufficiently pronounced financial incentives for high-tech industries. But in fact, they occur only in technology parks, industrial parks, special economic zones, etc. Consequently, there are enough of them for entrepreneurs who want to develop high-tech industries and introduce innovations, and government officials have no doubt that the preferences will remain in the future.

The results of the analysis of the threat assessment of the group “institutional conditions” for the development of an innovative economy by business representatives are presented in table 3.

The data presented in table 3 allow us to state that the business highly estimates this group of threats both in terms of its influence and the likelihood of their implementation (on average, 4.32 and 4.28, respectively). The average generalizing amounted to 18.41 or 73.6% of the maximum possible value. Estimates of both the power of influence and the likelihood of implementation are consistent. However, the value of consistency varies across groups of indicators from 0.02 to 0.1. The greatest consistency of experts was observed in terms of the “lack of state support for joint projects of universities and industrial partners to create high-tech industries” (0.02; 0.02), the least - “low level of innovative culture of the population” (0.06; 0.10).

Table 3. Threat assessment of the group “institutional conditions” for the development of an innovative economy by “business”.

| Threats | Averages | Indistinct indices | Summary indicator |
|---------|----------|--------------------|------------------|
|         | The probability of the threat | Threat power | The probability of the threat | Threat power |                  |
| 9       | 3.97     | 4.29               | 0.07             | 0.05          | 16.96            |
| 10      | 3.81     | 4.48               | 0.05             | 0.02          | 17.05            |
| 11      | 4.32     | 3.90               | 0.04             | 0.04          | 16.84            |
| 12      | 4.42     | 4.84               | 0.02             | 0.02          | 21.37            |
| 13      | 4.55     | 4.61               | 0.06             | 0.04          | 20.93            |
| 14      | 4.48     | 4.20               | 0.06             | 0.07          | 18.75            |
| 15      | 4.55     | 4.26               | 0.06             | 0.10          | 19.26            |
| 16      | 4.23     | 3.94               | 0.05             | 0.06          | 16.58            |
| 17      | 4.16     | 4.32               | 0.04             | 0.05          | 17.95            |

Threat assessment at the “very high” level in terms of a generalizing indicator was received: “lack of state support for joint projects of universities and industrial partners to create high-tech industries”
(general indicator 21.37) and “lack of the necessary legal framework to protect owners of intellectual property results” (20, 93).

The lowest (but, nevertheless, high) rating was given to the threat “low level of business susceptibility to innovation” (16.58). That is, business representatives consider their institution to be the least (but, to a high) degree con-straining innovative development.

The assessment of threats from institutional conditions by authorities is presented in table 4.

Table 4. Threat assessment of the group “institutional conditions” for the development of an innovative economy by “authorities”.

| Threats  | Averages | Indistinct indices | Summary indicator |
|----------|----------|--------------------|-------------------|
|          | Probability of the threat | Threat power | Probability of the threat | Threat power |                |
| 9        | 3.73     | 4.00              | 0.06              | 0.09         | 14.83          |
| 10       | 3.91     | 4.09              | 0.05              | 0.09         | 15.91          |
| 11       | 4.00     | 4.00              | 0.08              | 0.09         | 15.89          |
| 12       | 3.73     | 3.64              | 0.05              | 0.03         | 13.54          |
| 13       | 3.45     | 4.09              | 0.09              | 0.05         | 14.07          |
| 14       | 4.45     | 4.27              | 0.02              | 0.02         | 19.02          |
| 15       | 4.36     | 4.27              | 0.05              | 0.09         | 18.55          |
| 16       | 4.09     | 4.09              | 0.07              | 0.06         | 16.67          |
| 17       | 3.36     | 3.73              | 0.02              | 0.05         | 12.52          |

As you can see, government officials are much more optimistic about the threats emanating from the institutional environment. The average value of the general indicator is only 15.67 (24.9% lower than that of a business). Estimates are highly consistent. The greatest consistency of assessments is observed for the threat of “external sanctions” (0.02 in terms of influence and probability), the least - in the presence of barriers to the inclusion of Russian innovative companies in international production cooperation (0.09 and 0.08, respectively).

None of the threats received a rating of “very high”. Five out of nine threats are recognized high. The highest assessment of the impact of external sanctions (in business this is only the fourth most important threat). It is interesting that the assessment of the level of susceptibility of innovation by business for both institutional groups is almost the same in terms of scores, but in relation to other threats to the institutional environment it is much higher for representatives of the government than for the business itself (for authorities it takes the third most important position out of nine).

The government recognized the least threat associated with the lack of the necessary relationship between the subsystems of the region’s innovation system (they are the fifth out of nine among business representatives). As you can see, the opinions of expert groups, in any case, regarding the most and least pronounced threats are built in such a way that their influence is associated not with their actions, but with the position of the cooperating party.

Assessments of personnel threats to the development of an innovative economy by representatives of business and regional authorities are presented in table 5.

Table 5. Threat assessment of the “personnel problems” group to the development of an innovative economy by “business” by “authorities”.

| Threats      | Average | Indistinct indices | Summary indicator |
|--------------|---------|--------------------|-------------------|
|              | Probability of the threat | Threat power | Probability of the threat | Threat power |                |
| 18 (business)| 4.42    | 4.55              | 0.07              | 0.04         | 20.05          |
| 19 (business)| 4.52    | 4.26              | 0.06              | 0.06         | 19.17          |
| 18 (authorities) | 3.73 | 3.64              | 0.11              | 0.09         | 13.43          |
| 19 (authorities) | 4.64 | 4.91              | 0.00              | 0.05         | 22.76          |

As you can see, both groups of experts assess this group of threats as significant, however, if the business values of the generalizing indicators of both factors are at the same level, then the govern-
ment’s threat is “the backlog of higher education in training personnel with competencies adequate to the requirements of an innovative economy” than “brain drain” (gap of 9.33 points).

The consistency of assessments of each group is quite high (a low level is only in assessing the likelihood of a lag in the training of higher education personnel). The fuzzy index in the estimates of government officials regarding the likelihood of a brain drain of 0.0 is a consequence of the “rounding” of values, however, we must admit that the experts in this case are very close to unanimity.

4. Conclusion
A generalization of the above allows us to draw the following conclusions.

Among the threats that could have a negative impact on the development of innovative economy, there is not one that has received a value of "very high" by both groups of experts.

All threats related to financing were highly appreciated by business representatives. The authorities are more optimistic about this group of threats, only five out of eight are rated as “high” in terms of a general indicator. The highest, in their opinion, is the threat of a low level of budget financing of science and higher education. Business representatives consider it the third most important in this group of threats, and the most significant is the lack of incentives for banks for long-term financing of innovative projects. The threat associated with the lack of enterprises' own financial resources for innovative purposes is almost also highly appreciated. If we take into account that the lowest rating in the group of “financial” threats was received by the absence of tax benefits and other preferences for high-tech entrepreneurship, we can conclude that the business itself is ready to pay for innovative development if there are resources.

In the group of institutional conditions, according to entrepreneurs, the highest threats are related to the lack of state support for joint projects of universities and enterprises to create high-tech industries and insufficient protection of intellectual property. According to representatives of the authorities, these threats are of medium importance. The highest (but not reaching the “very high” value, level is assigned by the “authorities” to the threat of “external sanctions.” The least pronounced, from their point of view, comes from the underdeveloped interconnections within the innovation system.

Personnel problems are few in number, but assessed by both groups of experts as “very high” or “high” (on the upper bound of the assessment). Only the backlog of higher education by government officials is rated as "average" with a "very high" rating of this threat by business.

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