

Portfolio management technology of innovations distribution in social and economic system

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Abstract. A new management technology of innovations distribution based on building of the portfolio of interacting innovations is submitted by authors. To building the portfolio the functional interdependences and the complementarity of various types of innovations are defined, the aggregate effects arising in case of their interaction are established. Using the system effects arising in case of interaction of innovations the portfolio technology allows considering also investment risks, which act to raise the efficiency of innovations promotion in social and economic system.

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Introduction

Nowadays in social and economic systems of the Russian Federation there was a known contradiction between the structure of technological ways in economy, a weak theoretical and methodological readiness of action of the market relations in questions of the innovative development of the territories having a weakly diversified economics and need for increasing of its innovativeness [1]. Innovative development features of social and economic systems in the Russian Federation are connected with a lack of effective innovations promotion mechanisms that proves need for the management of innovations interaction process [2].

According to the classical theory "Diffusion of innovations" represented by T. Hegerstrand, the process studying sense of innovations distribution consists in a prediction of emergence time and distribution features of any innovation within studied social and economic system. Available theoretical developments in the field of innovation management allow to draw a conclusion that distribution process of new goods or services comes wavy, herein, the more smart a technological way of the new products production, the more significant a force of waves proceed from innovations production [3].

Relying on this theoretical provision, authors during research revealed availability of processes of interaction in economic space of the territories of the innovations waves proceeding from different sources of innovations production [4].

The main part

For the purpose of detection of functional interdependence of various types of innovations influencing on activity of their distribution, it is necessary to establish the innovations interaction directions, determining level of complementarity and the aggregate effects arising in case of their interaction [5]. It is assumed a new development of conceptual approach of innovations distribution. The conceptual approach is based on determination of the degree of innovations concentration in space, the level of missing concentration, the creating, the searching or the attracting of the innovations which parameters will allow in necessary degree to compensate missing concentration of an existing innovation with use of multiplicative and synergistic effects in case of their interaction. The additional innovation, by means of which interaction is performed, is determined as a forecast or "managing".

Considering that the result of interaction of complementary innovations is the emergence of the system effects strengthening degree of perception of innovations in social and economic system [6], authors proved need for their use in case of acceptance of the management decisions. They are:

- Searching and creating collaborations with the centers of innovative development – partners in promotion and interaction of the uniform innovations providing multiplicative effect [7];
- Directions determination of interaction of the complementary innovations exhibited emergence properties based on cooperation of several factors which influence on innovations distribution and

differed from composition of separate effects and provides synergistic effect [8].

The multiplicative effect of interaction of two innovations is shown in fig. 1.

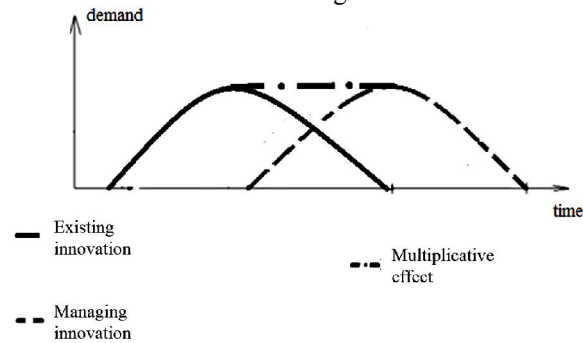


Figure 1. Multiplicative interaction of two innovations

Basic provisions of new conceptual approach to management of innovations distribution are based on interaction of innovations management theories and innovations distribution and consist in the following:

- Problems allocation and research of the factors influencing on innovative development of social and economic system, and explanation of need for management process of innovations distribution;
- Determination of intensity degree of distribution of an existing innovation in social and economic system and development of management function of innovations distribution in the centers of innovative development;
- Arrangement of complementary innovations exhibited emergence properties and provided synergistic effect during interaction;
- Searching and creating collaborations with the centers of innovative development – partners in promotion and interaction of the uniform innovations, that cooperate enhancement of their perception;
- Implementation of multiplicative effect of innovations interaction;
- Portfolio creating of the interacting innovations, providing multiplicative and synergistic effects in case of distribution of interacting innovations and decreasing in investment risks.

The developed portfolio management technology is based on using the innovations interaction effects, diversification and decreasing in investment risks. The main stages consist in the following:

1. The set of the innovations which are subject to distribution in social and economic system, is provided as a set $A = \{A_1, \dots, A_j\}$. Generally, these are raw, technological, product, market and organizational projects [9].

2. The specified set of offered projects breaks into five not being crossed subsets:

$$UA^i = A, \quad i = 1, \dots, 5$$

where $A^1 = \{A^1_{j1}, \dots, A^1_{jk}\}$ – projects of a raw orientation;

$A^2 = \{A^2_{j1}, \dots, A^2_{jM}\}$ – technological orientation;

$A^3 = \{A^3_{j1}, \dots, A^3_{jS}\}$ – product orientation;

$A^4 = \{A^4_{j1}, \dots, A^4_{jR}\}$ – market orientation;

$A^5 = \{A^5_{j1}, \dots, A^5_{jN}\}$ – organizational projects.

It is supposed that innovative projects from the set of A^1 involve dependent projects: technological, product, market and organizational, not entering A^i , where $i = \overline{2,5}$; projects on innovations distribution from the set of A^2 involve the product, market and organizational projects which also aren't entering A^i , $i = \overline{3,5}$; and it is similar for sets of A^3 and A^4 .

2. For each of A^1_{jk} and implicated innovative projects an expected return is calculated with account of multiplicative and synergistic effects – D^1_{jk} , $k = \overline{1, R}$ and it is similar for all projects from sets of A^2 , A^3 , A^4 , A^5 . It is supposed that implementation of implicated (dependent) projects will give synergistic effect.

3. To forming of a diversified portfolio of interacting innovations we will enter the Boolean x_j variables $x_j \in \{0, 1\}$: $x_j = 1$, if j -project from a set A joins a portfolio, and $x_j = 0$ – otherwise.

4. The portfolio is created in case of the following natural restrictions. The promotion of each innovative projects requires certain costs – b_j . Considering that the amount of resources is limited – B , restriction on the budget will register in a type:

$$\sum_{j=1}^J b_j x_j \leq B. \quad (1)$$

Obviously, that

$$\sum_{j=1}^J b_j > B.$$

In case of innovations promotion the required level of profitability D for the centers of innovative development should be provided:

$$\sum_{j=1}^J d_j x_j \geq D, \quad (2)$$

in case of inclusion in a portfolio of limited number of innovations with account of synergistic effect the big profitability will be received.

5. The one-to-one relationship between d_j – profitability of each j -project and implicated ($\bar{U} = \bar{1}, \bar{J}$) and projects from sets of A^i , $i = \bar{1}, \bar{5}$ is established.

6. The risk of a portfolio is calculated on a formula

$$\sigma_p^2 = \sum_{j=1}^J x_j b_j^2 \sigma_j^2 + 2 \sum_{j=1}^J \sum_{l=1}^J x_j x_l b_j b_l \sigma_{jl}, \quad (3)$$

where σ_j^2 – own risk of the innovative project and implicated innovations distribution projects; σ_{jl}^2 – the covariance of projects profitability.

7. The risk minimization of the innovative projects portfolio in case of restrictions on the budget and profitability level will correspond to a known as knapsack problem which in case of small dimensions could be solved by full enumeration, and in case of the big ones – by heuristic methods, for example, by the algorithms of ant colonies [10].

Conclusion

The solution of a management problem of innovations distribution in social and economic system requires for research of methods of innovations distribution existing in market economy, an assessment of their sufficiency and, if necessary, development of additional management technologies of the decision making that increase of an innovative susceptibility of social and economic system. Basic provisions of conceptual approach to management of innovations distribution in social and economic system consider specifics of its innovative development; prove need for functions management of innovations distribution with using of their interaction effect.

Deduction

Portfolio management technology with using of system effects in case of innovations distribution in social and economic system represent a new view on the purposes and problems of increasing of innovative development efficiency and provides:

- Coordination between interacting innovations;
- Using of multiplicative and synergistic effects in case of management of innovations distribution;

- Decreasing in the investment risks concerning an innovations promotion;
- Significantly strengthening of corrective action on the process of innovations distribution.

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References

1. Avramchikova, N.T. and M.N. Chuvashova, 2014. Assessment instruments of a technological state of economic sectors of resource focused region. *Bulletin of SIBGAU*, 1(53): 186-189.
2. Avramchikov, V.M. and A.N. Antamoshkin, 2014. Assessment instruments of multiplicative and synergistic effects of innovations waves interaction. *Bulletin of SIBGAU*, 2(54): 150-155.
3. Hagerstrand, T., 1966. Aspects of the spatial Structure of social Communication and the Diffusion of Information. *Papers and Proceedings of the Regional Science Association*, PPRSA, 1(16).
4. Avramchikov, V.M. and A.N. Antamoshkin, 2013. Wave interference of innovations diffusion. *Economics and operating system management*, 2(8): 4-8.
5. Arora, A. and A. Gambardella, 2005. From Underdogs to Tigers: The Rise and Growth of the Software Industry in Some Emerging Economies. Oxford University Press, pp: 328.
6. Jaffe, A., J. Lerner and S. Stern, 2005. *Innovation Policy and the Economy*. Cambridge, MA: M.I.T. Press, Vol. 5, pp: 176.
7. Ansoff, I., 1999. *New corporate strategy*. SPb.: Piter Kom, pp: 416.
8. Hiroyuki, I., and T. Roehl, 1991. *Mobilizing Invisible Assets*. Harvard University Press, pp: 200.
9. Oslo manual. Date Views 04.07.2014 www.oslo_ru.pdf.
10. Dorigo, M. and C. Blum, 2005. Ant colony optimization theory: A survey. *Theoretical Computer Science*, 344(2-3): 243-278.

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