International scientific cooperation as a mechanism for diffusion of competences in the field of advanced manufacturing technologies

D. Tolmachev*, T. Lopatina

Graduate School of Economics and Management, Ural Federal University, Yekaterinburg, Russia

* novik1974@bk.ru

Two main channels of technology diffusion can be identified: innovation spillover and innovation transfer, which includes license trading, global innovation activity of multinational corporations and global S&T cooperation. We concentrate on the last one, considering S&T collaboration in the sphere of advanced manufacturing technologies (including robotics, additives, M2M, biotechnology).

Strategy of international S&T collaboration is decisive for participating organizations (obtaining competences) and its influence on the technology level of the location (as a result of technology transfer, staff migration etc.). Collaboration with organizations-leaders in particular field means not only getting competences, but also may have a number of significant shortcomings: necessity for attraction of additional resources to motivate foreign partner and for creating the system of competences reproduction. The most promising option is the collaboration in terms of relative leadership in specific areas (for instance, high level of publication activity in different topics in the same sphere) - it implies the mutual interest in the emergence and development of cooperation.

So the development of model of acting and potential international scientific collaborations identification and assessment is considered to be an important research task. Our model is based on complex analysis of competences and includes 18 indicators, which can be grouped into four blocks: scientific publication analysis, patent landscapes, research grants analysis, participation in industrial clusters. For example, Russian organization compares two potential collaborators in the field of autonomous systems. Figure 1 shows that TU Ilmenau has highly cited articles and experience in collaboration with Russian institutions, while South China University of Technology is active in publishing articles and in patenting, so the choice of academic partner depends on purposes of Russian organization.

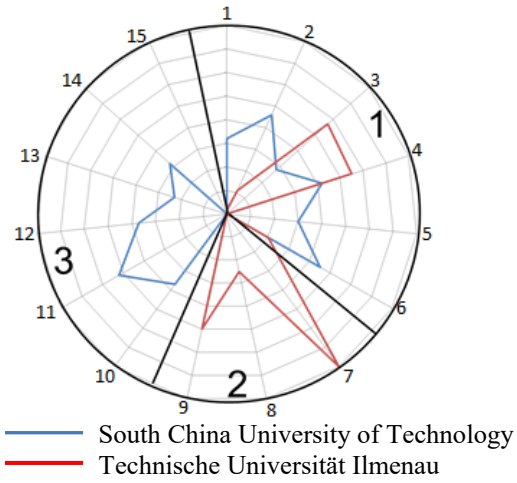

Figure 1: Comparison between potential partners (topic: autonomous systems, sphere: robotics), indicators are normalized to the maximum

Publications	1. Number of articles in topic 2. Number of articles in sphere 3. Field-Weighted Citation Impact in topic 4.Field-Weighted Citation Impact in sphere 5.Number of articles in collaboration in topic 6. Number of articles in collaboration in sphere
Experience in collaboration with Russia	7. Number of articles in collaboration with Russia in topic 8. Number of articles in collaboration with Russia in sphere 9. Number of articles in collaboration with selected Russian university in topic
Patents	10. Number of patents in topic 11. Number of patents in sphere 12. Number of citation patents in topic 13. Number of citation patents in sphere 14. Number of active patents in topic 15. Number of active patents in sphere

This model enables for a comparative analysis between the various alternatives under consideration. Such a comparison is necessary, due to the large heterogeneity of the included indicators and the various purposes that organizations can set themselves while finding potential foreign partners. In some cases, an organization may be interested in joint research, in others - in the commercialization of its competencies, or in applied works. In each case, the importance of indicators will be different.