Using Open-Access Resources and Platforms to Create a Technology Transfer Ecosystem *

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ABSTRACT

Technology transfer is a complex process that requires up-to-date and reliable information on various aspects of a technological solution. Approaches to improving the efficiency of technology transfer systems through the use of open access resources and platforms are considered.

KEYWORDS

open access resources, open access services, digital ecosysytem, technology transfer office

1. INTRODUCTION

Improving the national innovation system is a key factor in increasing the country's competitiveness in the modern environment, often defined as a "knowledge economy" and focused on the commercialization of scientific results. Of particular importance in this context are studies aimed at improving technology transfer and organizing effective interaction between all participants.

Technology transfer is considered as one of the most important instruments for national and regional economic growth.

Much attention in Belarus is paid to improving the functioning of technology transfer offices (TTOs).

The activities of TTOs are aimed at commercializing the results of R&D, ensuring the acceleration of solutions for technical and technological problems of enterprises, improving the quality of their products, and mastering the production of new types of products.

The main activities of TTOs aimed at the implementation of a set of measures related to transferring innovations from the sphere of their development to the sphere of practical application. They include:

- conducting market research to identify opportunities for implementing innovations by universities, scientific and other organizations;
- performing work to ensure legal protection and introduction of innovations into civil circulation;
- providing engineering and consulting services.

The implementation of new technologies and research results from the scientific and technical sectors in industry is a traditional task, and often the main activity of technology transfer offices. There are several main approaches to technology transfer.

Business assistance: companies providing services on specific issues related to technology can be considered as specialized organizations working in the scientific and technical sectors. In order to correctly navigate among such companies, many TTOs have extensive databases.

Technology dissemination means the transfer of specific knowledge from research institutes to a group of small and medium-sized enterprises with common technology needs.

Technology search consists of analyzing the national and international market in order to acquire promising technologies and commercial opportunities that can be used by companies in a certain region.

This task is often carried out independently of specific industry needs.

In addition to these direct approaches to technology transfer, TTOs are increasingly focusing on the use of various indirect technology transfer mechanisms, such as technology exchange through networks of companies, technology and innovation support centers, product development centers, outsourcing, etc. This means that attention is paid not only to technology transfer from research institutes to industry, but also to stimulating technology exchange directly within industry.

Participation in network organizations allows TTOs:

- develop and maintain high standards for their services;
- significantly increase opportunities for finding partners for technology commercialization projects.
- implement innovation policy at the interregional and international levels.

TTOs, participating in the work of technology transfer networks, can more effectively provide their clients with the following services:

- search for partners for the joint implementation of technology commercialization projects for R&D, entry into new markets, etc;
- dissemination of technological information is a relevant service for scientific organizations that are interested in widely informing industry and companies about their research capabilities and competencies;
- promotion of technological projects using various networking tools;
- a primary analysis of supply and demand in certain subject areas of research.

The main role in the Belarusian technology transfer network infrastructure is played by the Republican Technology Transfer Center (RCTT).

The organizational structure of the RCTT network includes members, clients, partners and a coordinating organization.

Members of the network are research organizations, higher education institutions, enterprises and organizations of all forms of ownership that have TTOs or divisions responsible for

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technology transfer in their structure. Within the framework of the methodology adopted in the RCTT network, network members help their clients prepare proposals for cooperation, requests for the implementation of R&D. [1]. There are 3 options for disseminating them:

- they are posted by network members on the RCTT Internet portal;
- they are posted at the request of network members by the coordinating organization in foreign technology transfer networks;
- they are posted on the websites of foreign partners of the coordinating organization.

Network members help their clients prepare information on the products and services of the organization for posting them at a virtual exhibition on the Internet portal of the Russian Center for Technology Transfer. Network members also monitor external and internal markets to find the target consumers for the organizations. Clients of the network are suppliers and consumers of technologies (research and design organizations, educational institutions, enterprises and organizations of all forms of ownership).

The RCTT is a consortium for coordinating activities in the field of technology transfer, which includes

- head office in Minsk;
- 5 branches in the regions of the Republic of Belarus and 30 branches at research organizations, higher education institutions and enterprises of the Republic of Belarus;
- 97 foreign organizations in 23 countries.

The main objectives of the activities of the RCTT branches at manufacturing and industrial enterprises are:

improving the quality and reducing the cost of manufactured products;

assisting in the expansion of sales markets.

OPEN ACCESS SERVICES FOR INFORMATION SUPPORT OF TTOs

TTOs use various information system and resources to effectively manage and transfer technologies. Some of them are:

- Patent and invention databases: these resources help track and manage intellectual property.
- Scientific publications databases: these resources allow TTOs to stay abreast of the latest advances and innovations in various fields.
- Collaboration and knowledge sharing platforms: such platforms help researchers and developers exchange ideas, find partners, and collaborate on projects.
- Project management information systems: these systems help coordinate project work.
- Marketing and analytics tools: these tools are used to analyze the market and identify needs and opportunities for the commercialization of technologies.

To operate effectively TTOs need high-quality and timely information.

Although patent information has become more accessible in recent years, including through services provided via the Internet on a paid or free basis, the coverage and availability of patent data in some countries, including Belarus, remain limited.

Taking into account such limitations, in 2009 the World Intellectual Property Organization (WIPO) launched an international project to create a network of Technology and Innovation Support Centers (TISCs), the purpose of which is to simplify access to technical knowledge and improve the efficiency of using patent information.

The National Intellectual Property Center (NIPC) is creating a network of TISCs in the Republic of Belarus in accordance with the Agreement between WIPO and NIPC dated October 10, 2016. As part of its implementation, NIPC performs the functions of a coordinating body.

Currently, there are 29 TISCs operating in the Republic of Belarus.

The creation of the TISCs has improved information and scientific-methodological support for information and patent activities, increasing the efficiency of using IP objects.

High-quality scientific information is also one of the most important factors facilitating technology transfer.

Underdeveloped information infrastructure and the lack of objective data on advanced scientific knowledge and developments create serious barriers to the further development of science and its commercialization, significantly reducing the efficiency of TTOs. The so-called "serial publication crisis" [2] has a negative impact on the quality of information support for TTOs, caused by the fact that the traditional commercial economic model of scientific communication leads to a rapid increase in subscription prices with relatively unchanged budgets for organizations. The problem is that both TTOs specialists and researchers working in various subject areas face significant difficulties in the process of searching, obtaining and using information. In the context of the constant growth of scientific output and the simultaneous increase in the cost of access to information resources due to the fact that publishers seek to maximize their profits through the sale of subscriptions to scientific journals, scientists and other consumers of scientific information experience serious difficulties when it is necessary to find a potentially useful scientific result and get acquainted with it [3]. The deficit of high-quality scientific information resources deprives specialists of the opportunity to analyze and objectively evaluate the quality of research and development results.

The important place in the activities of the technology transfer offices is occupied by legal problems and issues of protecting intellectual property, including problems of legislative and judicial protection of copyright. The lack of relevant and up-to-date information in this area significantly reduces the effectiveness of the commercialization of scientific research [4].

To overcome these challenges, we suggest to use open access resources and platforms for facilitating information support of business processes during transfer knowledge and technology.

Open Access (OA) as a movement has been steadily gaining strength for roughly the last two decades. This is due to the following factors:

The number of publications in open access reaches 47% [5].

Research funding programs and foundations require that research results must be published in the OA repositories or OA journals. Many organizations support the requirements for the openness of primary data and research results.

The citation rate of OA scientific publications is higher than that of those distributed by subscription [6].

Open access resources are increasingly considered like an option to replace expensive commercial databases necessary for the information services of TTOs [7].

Using OA resources can significantly improve the efficiency of Technology Transfer Offices (TTOs). Below are some of the ways in which they can be used.

1. Access to scientific publications. Open access provides free and unrestricted access to scientific articles and research. This allows TTOs to stay up-to-date with the latest advances and innovations in various fields of science and technology.

2. Analysis of patent information. Many patent databases also provide open access to information. This helps TTOs track new patents, analyze trends, and find potential partners for licensing and commercializing technologies. For example, Espacenet provides free access to millions of patents worldwide

3. Collaboration and knowledge sharing. OA platforms facilitate collaboration between researchers and developers. This allows TTOs to find partners for joint projects and share ideas. Examples of such platforms include ResearchGate and Academia.edu.

4. Training and professional development. OA resources can also be used for the training and professional development of TTOs. Online courses and webinars available on platforms such as Coursera and edX help TTOs staff stay up-to-date with new techniques and technologies.

5. Market Research. Using open data and analytics tools helps TTOs conduct market research. This allows for a better understanding of the needs and opportunities for commercializing technologies. Examples of such tools include Google Scholar and Microsoft Academia.

There are many integrated platforms and services for facilitating OA resources usage.

OpenAIRE (the Open Access Infrastructure for Research in Europe) enables the search, discovery and monitoring of the publications and datasets from 100,000+ research projects.

OpenAIRE actively supports the Open Science initiative. On the one hand, OpenAIRE is the network of dedicated Open Science experts promoting and providing training for Open Science.

On the other hand, OpenAIRE is a technical infrastructure harvesting research output from connected data providers. OpenAIRE aims to establish an open and sustainable scholarly communication infrastructure responsible for the overall management, analysis, manipulation, provision, monitoring and cross-linking of all research outcomes.

This combination of knowledge and a pan-European Research Information platform enables OpenAIRE to provide services for researchers, research support organizations, funders, content providers and TTOs such as:

- Integrate scientific information.
- Monitor and report on research outcomes for funders and partners.
- Train and support on all subjects related to OA.
- Discovery of OA output per project, funder, and data provider.

AMiner is a new generation of scientific and technological intelligence analysis and mining platform with completely independent intellectual property rights. It was established by a team led by Professor Tang Jie from the Department of Computer Science and Technology of Tsinghua University.

AMiner's scientific research data includes 331 million papers, 135 million scholars, 1.122 billion paper citation relationships and 8.79 million knowledge entities (this data is in dynamic change).

AMiner integrates academic data from multiple sources by data mining and social network analysis and mining technology to catch paper indexes.

AMiner cooperates with scholars and academic institutions to share papers and scholar data and purchase copyright.

CORE provides access to the world's largest collection of open access scholarly papers by collecting and indexing research from repositories and journals. It is a non-profit service dedicated to the open access mission and a signatory to the Principles for Open Scholarly Infrastructures (POSI) [8]. CORE serves a global network of repositories and journals by improving discoverability and preventing misuse of their content; ensuring that metadata records are uniquely identified; supporting data providers in applying best practices by providing tools for metadata validation, content management, enrichment, and OA compliance; and facilitating machine access to open research. CORE's mission is to index all open access research worldwide and make it accessible to all. In doing so, CORE:

- enriches scientific data using modern text and data mining technologies to make it easier to find;
- enables others to develop new tools and use cases based on the CORE platform;
- supports the network of OA repositories and journals with innovative technical solutions;
- promotes the creation of a scalable and cost-effective way to provide open scientific information.

CORE aggregates research papers from data providers around the world, including institutional and subject repositories and journal publishers. This process, also called data harvesting, enables CORE to offer search, text mining, and analysis capabilities not only on metadata but also on the full text of research articles, making CORE a unique service in the research community.

BASE is one of the largest search engines in the world, particularly for academic web resources. BASE provides over 300 million documents from over 10,000 content providers. Full texts of about 60% of indexed documents are available free of charge [9]. BASE indexes the metadata of all types of academically significant resources (journals, institutional repositories, digital collections, etc.) that provide an OAI interface and use OAI-PMH to provide their content. The index is constantly being expanded by integrating new sources/content providers. Database managers can integrate the BASE index into their local infrastructure (e.g., metasearch engines, library catalogs).

International research collaborations can bring TTOs new opportunities for collaborative research, increase the impact of their research, and boost the commercialization of scientific results. For instance, knowing which institutions globally work on similar research can help identify new partnership opportunities. Identifying existing connections among researchers between those institutions can help drive development opportunities. These data have come through costly subscriptions to restricted databases. OpenAlex now provides the data required for international intelligence freely to all users across the globe [10].

CONCLUSION

Open access platforms and services provide technology transfer offices with effective tools for searching, disseminating and using scientific publications for the purposes of commercializing research. Their use contributes to the acceleration of technology transfer and the increase in the efficiency of innovation activities. OA resources may be integrated using API into the structures of the digital ecosystem of technology transfer, which includes agents (scientific organizations and teams), objects (information and knowledge) and infrastructure (services and information systems).

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