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INTERNATIONAL TECHNOLOGY TRANSFER AS A FORM OF INNOVATIVE DEVELOPMENT OF ENTERPRISE

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Introduction

Increased globalization and integration of world economy requires the use of new theoretical and practical aspects of economic development of countries deriving on the first place using innovation through commercialization of intellectual factors. Therefore, an important and perspective mechanism of economic stabilization of the country can be considered international technology transfer.

Some theoretical and applied aspects of the essence of technology transfer is detailed in the works of Ukrainian and foreign scientists V. Soloviev, N. Chukhrai, N. Fonshtein, A. Shaposhnikov, V. Titov, O. Lyashenko, A. Salikhova, N. Artamonova, K. James, V. Souder, R. Seaton, D. Gering, P. Massey. However, in-depth research is required using international technology transfer as a form of innovation development of enterprises.

Economically developed countries have successfully used technology transfer to regulate the relationship between science and industry, knowledge and experience, process and produced products. This mechanism of innovative process creates the conditions both in law and on the organizational level for using scientific and research capacity in the private sector, in small and medium enterprises [15]. Technology transfer enables a better position and structure of presence in the international market, based not on administrative impact on the structure of production of goods and services of the national private sector but

on market mechanisms of transfer of advanced scientific developments into production.

1. International technology transfer: the nature and classification.

In the global economy created a more powerful national systems of technology transfer, forming the international technology market. The most powerful system of technology transfer is the national system of the United States of America. The developed system of international transfers are also in Japan, Israel and the UK.

For countries with transformational economy type development of technology transfer can be a step towards restructuring of the economy and its reorientation to innovative development. Unlike the practice in other countries, in Ukraine, the technology transfer has not been developed yet [6].

However, the role of technology is a determining factor in achieving maximum profit margins. And since each company is responsible for the results of their activities to their capital, then obviously their desire to participate in the processes of global technology trade. Currently, in the world there is a struggle on the technological front, as the cost of new technologies pay a maximum for a year and a half, while the simple extension of production on technology and technical basis of the previous level - 5-7 years [9].

At present time the Ministry of education and science of Ukraine in the face of the Department of innovative activities is working on the development of state mechanisms of regulation of the technology market in Ukraine in several directions, which can be formally combined in two main:

- development of the legal framework in the field of technology transfer and the development of public policy in the commercialization of intellectual activity from the state budget of Ukraine.

- development of infrastructure of the Ukrainian market of technology by creating the basic market mechanisms and the attraction of companies to work

on existing intellectual property created as a result of the implementation of the state scientific-technical programs.

In the context of these areas, it is advisable to determine the nature and classification criteria of technology transfer.

Today, the technology transfer involves not only knowledge transfer, but also their transformation into an innovative technology with the active participation as the source of this technology/invention, the receiver/user and the end user of the product manufactured using this innovation. The technology transfer involves at least two key actors in this process, the presence of which is a mandatory condition of its existence – the source and the recipient of technology.

Technology transfer acts as a tool for the dissemination and implementation of technology. In scientific literature there is no single, universal interpretation of the concept of technology transfer. Existing approaches to the interpretation of relevant scientific and practical categories are characterized by considerable differences regarding the definition of the nature and forms of technology transfer. Critical analysis of scientific literature enables to identify the commonality and difference of views of domestic and foreign scientists on the formation of the methodology of technology transfer (table. 1).

Table 1. Approaches to definition of the category "technology transfer"

The author, the source	The fundamental essence	Advantages/Disadvantages
	The content	
At. 1. p. 13. The law of Ukraine "On state regulation of activities in the field of transfer of technologies", V. Soloviev [13], V.	1. The transference of technology	(+) delineated the legal side of TT;
	Issued the contract, which defines the property rights and obligations on technology; industrial development	(-) not defined the role and purpose of the implementation of TT.

Titov [14], Salikhova	technology relies on the recipient; technology creation in the public sector enjoy financial support from the state.	
Council for scientific and industrial research (CSIR), O. Lyashenko [7], V. Denisyuk [4], V. Souder, P. Massey [8], D. Gering	2. Process	(+) identifies the role, the implementation of TT; defined process turning ideas into a commercial product; the possibility of using human knowledge and experience.
	The transformation of intellectual property into a physical product or process, which generates commercial value, or can be used for the benefit of society; exchange of skills, knowledge, technologies, methods and patterns of production between governments and agencies to ensure innovation development and greater accessibility to a wide range of users.	
N. Chukhrai [3], N. Fonstein, R. Seaton[12]	3. Type of communication and interaction	(+) identified the need for close relationships between the parties;
	The application of knowledge, their target usage requires concerted actions of two or more individuals; cooperation and interchange of information between people over a long period; economic relations in the sphere of use of new systematized knowledge.	
N. Artamonova [1], A. Shaposhnikov [11]	4. Activity	(+) determined the relationship between by the parties; course of formation of knowledge, experience, industrial property, distribution, transfer, purchase, implementation
	Aimed at creating conditions for the collaboration of developers with potential buyers; the sequence of actions in which knowledge, experience,	

	industrial property freely distributed or sold by enterprises for the implementation of the quality of the product or process.	
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Source: systematized by the author according to [1-15]

The conducted research give us the opportunity to form their own understanding of technology transfer as a process.

Considering the phenomenon of international technology transfer, it can be argued that it is a tool to attract and absorb advanced technologies, especially for countries that are developing, and therefore an important factor of innovative development.

According to definition in [4, p. 43], the transfer of technology is the transfer of "systematic knowledge about the production, about the application process or the provision of services...", and there is a displacement technology (system of knowledge) with the use of information resources. But the international transfer of technology should be considered in a broad sense, namely: it is a set of economic relations in sphere of use of new system of knowledge production about the application process or the provision of services between the owner (developer) and a consumer resident in one country, and in the case of international technology transfer of residents with nonresidents of the country.

The variety of types and forms of technology transfer led to the necessity of systematization of classification features of technology transfer (table. 2).

Table 2. Classification of technology transfer in enterprises

	Classifications	Types of technology
	By the shape	The material forms of the technologies:

		<p>“turn key” enterprise, processing line, machinery, equipment, tools, etc., intangible forms of technology: patents, licenses, know-how, knowledge, experience, technical documentation, etc.;</p> <p>services: scientific, technical, engineering.</p>
	By appointment	Technology of products, technology of processes, technology of management.
	By means of technology transfer	Commercial and non-commercial, bilateral and multilateral, formal and informal, internal and external technical; engineering; industrial; information.
	By the field of dissemination	Interstate, inter-regional, regional, inter-industry, inter-firm.
	By the type of technology transfer	Vertical (between parent and subsidiary companies) and horizontal (between independent firms).
	By technological content achievements that are passed enterprise	Technical transfer in materialized form; information in the form of intellectual products.

Source: [10]

2. Commercial and non-commercial international technology transfer

For the main forms of international technology transfer that can be used to provide innovative development of enterprises, it is advisable to include commercial and non-commercial transfer.

The main forms of technology transfer on a commercial basis are:

- selling technology in a materialized view (machines, equipment, technological lines etc.); this type of technology transfer associated with direct investments in construction, reconstruction, modernization of firms, industries;
- portfolio investment, including if they are accompanied with stream investment products, and leasing;
- sale of patents and licenses for all types of patented industrial property;
- sales of licenses for non-proprietary types of industrial property ("know-how", trade secrets, technological experience, accompanying document to the equipment and technology that is transferred, and also training, advisory support, expertise, etc.);
- joint R &D, scientific and industrial cooperation; engineering; franchise.

The subject of non-commercial technology transfer is the value of knowledge or generic information, which include: basic research, scientific discoveries and technological inventions. Non-commercial technology transfer is often used in the field of scientific research of a fundamental nature. It is usually accompanied by small costs and can be supported by the state, and on the basis of brand and personal contacts (table. 3.) [2, p. 200].

The main tools of non-commercial technology transfer are presented in table. 3.

In informal channels of technology transfer include publications, symposia, exhibitions, trips, and other tools that contribute to technology transfer. These informal methods of technology transfer are forms of technology transfer on a grant basis.

Table 3. Tools of non-commercial technology transfer

Tools of non-commercial technology transfer		
Free scientific and technical information:	Reports and presentations on: internationa	Internship scientists and specialists in universities and

scientific and professional technical magazines, periodicals and other specialized literature, databases and data banks, patent publications, documents, manuals.	l conferences, seminars, symposia, fairs, exhibitions.	organizations; exchange of licenses and technical information on a parity basis; the creation of small firms venture capital type specialists from the same or from different countries; the creation of large corporations foreign marketing divisions; migration of scientists and specialists, including the “brain drain”.
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Source: [17]

Gratuitous form of technology transfer, including corporate transfers do not require a cruel regulation. Commercial forms of technology transfer, domestic and international are issued in the form of a contract (license, on scientific-technical cooperation, joint production or the contract of purchase and sale).

Under the transfer of technology through internal channels refers to all other forms of technology transfer: joint ventures controlled by local party licensing, international sub-contracts and others. This activity can be described as the transfer of technology not related to investment flows. Joint ventures in the world were and are the institutional form through which cost of certain legal restrictions on imports of capital. This form of international cooperation, for example, is used in Japan.

The difference between the transmission technologies in internal and external channels is that in the first case, the firm reports technology, constantly has a significant financial interest in the success of its subsidiary, which transferred technology. It allows it to use trademarks, provides access to international networks of technology and marketing, oversees the decisions of the subsidiary in the field of investment, technology and marketing and

examines the activities of the subsidiary as an integral element of this global strategy.

Transferring technology by foreign channels lack one or all of these features. As for advanced technologies, sometimes transfer through internal channels may be the only available means of transfer. The main share of the world technology trade are sales of non-patent licenses, since they do not require additional R&D and provide for minimum commercial risk [8, p. 106].

In the world of technology transfer, the most widely license agreement providing for the complete technological sharing with the provision of know-how and engineering services. A most of licensing agreements is concluding by a large industrial companies.

Technology transfer on a commercial basis is almost always accompanied by the issuance of the license agreement, which, in addition to the patented information may contain other provisions and requirements binding on the parties [8, p. 107].

3. The main forms of the technology transfer

Let's consider the actual forms of technology transfer which are used by industrial enterprises, their advantages and risks:

1) Patent or license agreement.

Signing the license agreement, a patent holder transfers [to the ownership](#) of other company the right to use technology developed by him, or a product in a certain territory during certain time.

There are two main types of licensing:

a) the license, which gives exclusive right to use the technology in a certain territory;

b) the license without exclusive right, which provides a possibility of the patent holder to transfer the right of using technology to other companies in this territory.

At the conclusion of the license agreement, the parties, as a rule, discuss a possibility of the sublicense - transferring the license by the buyer to the third party.

The *advantages* of buying a license / patent include low costs in comparison with other methods of technology transfer. However buying a license requires sufficient knowledge, experience, specialists and production base for independent implementation of technology.

2) Technical support agreement.

Such agreement provides participation of a technology developer in its implementation and rendering technical support at each stage of a transfer.

Attracting a technology developer in a process of transferring ensures closer cooperation between two parties, which promotes the full transfer of knowledge and skills. Thus, the technical support agreement can become a part of the Licensing Agreement, thereby increasing efficiency of a transfer.

3) Joint Venture.

Joint venture is an agreement on joint activity between two and more companies, provides consolidation of assets, joint management, risk sharing, participation in profit, production, service and marketing.

The *advantages* of joint venture include a long cooperation between parties, motivation of all participants in successful technology implementation and lower expenses compared to if the companies worked separately.

It is reasonable to refer to *disadvantages* of joint business, first of all, it is different vision and different purposes of partners, restrictions of independence in management. Besides, the companies can not always objectively determine the value of the contributed capital of each party and, therefore, and further profit distribution.

4) Franchising.

Franchising is a type of agreement in which one company transfers to another company the right to produce and sale goods in a certain territory, using

the existing brand and a business model. The company-owner of a trademark usually transmits its experience in managing technology as well.

The main *benefit* of franchising is the fact that the company buys already ready brand. Together with technology, it receives the checked business model, instructions in management and marketing.

Disadvantages include the company's dependence upon the owner of technology. In most cases, the company has to buy raw materials, the equipment, products only from certain suppliers. According to the term of the contract, it is often limited in selling business and in expansion into new markets. The company has to follow the rules and procedures of the company-owner. Besides, the deterioration of the business image of the franchise owner may affect the companies that has bought this franchise.

5) Strategic partnership.

The agreement of strategic partnership is signed, as a rule, between two and more large companies for using specific competences of each for developing new innovative technologies. Joint laboratories, research programs, release and promotion of a new product can be forms of partnership.

Typically, the joint efforts of partners give better results than independent development of a new direction. During the joint work, each company can get necessary expertise in new areas and forms of governance.

The *disadvantages* of strategic partnerships include difficulties in management connected with different culture of companies and two teams of managers which have different approaches. The companies may have different goals and strategies of joint technology.

6) Turn-key agreement

In the «turn-key» project the supplier is responsible for the development, creation, delivery, commissioning and technology transfer to the customer. The

supplier also guarantees all specified characteristics and performance of the technology he created.

Such agreement has the following *advantages*: the company signs the agreement only with one contractor who takes full responsibility for the project execution; project costs are fixed, except force majeure circumstances; the customer obtains a guarantee that the project will be not just executed, but also will work with a certain efficiency.

The *disadvantages* of this form of international transfer are the following: the company should know in advance all the functions and output parameters that should be inherent the technology after its launch; in the case of complex or large-scale technology, it requires deep knowledge in the field where the technology is purchased; the price of «turn-key» transfer is usually much higher than any other method (besides, the more the contractor assumes the risk, the higher the price is); the company has no complete control of the progress and quality of each stage of the transfer; for buyer it is difficult to determine the financial position of the contractor and its ability to self-finance all phases of transfer (financial problems of the contractor can entail the termination of all project).

Attraction of the technology developer to equity participation of new production can be one of methods of decreasing risks in case of turn-key project implementation. This will motivate the creator to provide quality transfer of technology.

7) Purchasing of equipment or service.

Purchasing of equipment is simple and one of the most common methods of technology transfer.

The main *disadvantage* of this method is the fact that the company limits itself by technical knowledge embedded in equipment and does not get new competence in management and organization of production. In addition, the

equipment available in the market does not give the buyer unique opportunity, as this equipment can be purchased by its competitors.

8) Hiring the foreign manager or expert.

The technology can be transferred through the competent expert whom the company can «entice» from another firm.

This method of a transfer is the least expensive, but tend to be effective only for small projects with fairly simple technology. Also, the technology should not be patented.

9) Purchasing of foreign firm.

The company can buy the foreign firm that provides perspective innovative developments. In this case, the company gets not only new technology, but also a team that is able to develop it further and also purchasing of a foreign firm automatically brings the company into new international markets. To the main risks upon purchasing the existing firm we can refer possible departure of key employees after its sale. As a rule, if the technology is successful, the firm owners agree to sell it only at price which several times exceeds market price that in turn creates big risk of the technology payback.

10) Foreign direct investments.

Attracting foreign direct investment is one of the main methods of technology transfer at the national level. A foreign company often invests in developing country in order to create a new market, to bypass export barriers and to get an access to a cheap labor.

In this case, the country gets all advantages of the technology transfer, including development of its own research activity. In addition, this is a way of creating new workplaces, getting taxes and other dividends which aren't connected directly with the technology. However, in most cases, to attract large investors, the government has to make some concessions in its policy. Practice shows that without providing necessary conditions, large international corporations don't agree to large-scale investments into developing countries.

11) Buy-back contract

Buy-back contract is a form of agreement between developing countries and big foreign companies. In this case, the foreign company delivers capital equipment in exchange for profit from sale of raw materials or goods produced using this equipment. Such form of transfer is often applied in case of building new plants or research deposits in developing countries.

To possible *disadvantages* we can refer motivation of the foreign company to start production at minimal expenses, which certainly affect the quality of execution. Typically, the price of the technology in such agreement is much higher than in case of direct investment.

12) OEM-agreement (Original equipment manufacturing)

OEM-agreement can be considered as a form of subcontracting in which the local firm makes products according to the exact specification of the foreign company. At the same time the foreign company transfers part of its technology and equipment, provides training and administrative reorganization. Subsequently, a foreign company sells products produced on their own channels and under its own trademark.

The main *drawback* of such agreement is the obligation to supply products of foreign company on fixed price which is much lower than market.

4. Organization of technology transfer at the enterprise

Organization of the technological transfer should be considered from two interconnected positions. The first – an internal focus on the technological exchange implementation and its technological potential. The second – the organization of commercialization processes of enterprise's technologies and buying foreign innovative technologies.

The process of technological transfer assumes commercialization of innovative technologies as first of all, that is one of tools of providing an

innovative way to develop the enterprise. Thus, among the first group of factors, the choice and implementation of innovative strategy of the enterprise (which, in turn, determines its technological strategy) have the largest weight, influence the organizational structure, corporate culture, and so on. In practice, many companies have no strategic concepts of innovation and technological development, and therefore decisions on projects in the field of technology acquisition are made without regard to the overall strategy. As a result of lack of permanent technological monitoring and internal audit the benefits are often given to basic technologies, but not new perspective one.

The key problem for industrial enterprises of Ukraine is the organization the process of technologies attraction. In case of technologies attraction special attention should be paid on the mechanism of receiving the technologies. At first the analysis of such factors is carried out: the innovative strategy of the enterprise, its technological position, the degree of organizational integration, relevance of obtaining, the amount of investment costs in development or implementation of new technology, its category and stage of life cycle.

The overview stages of process of a technological transfer at industrial enterprise are given in Fig. 2.

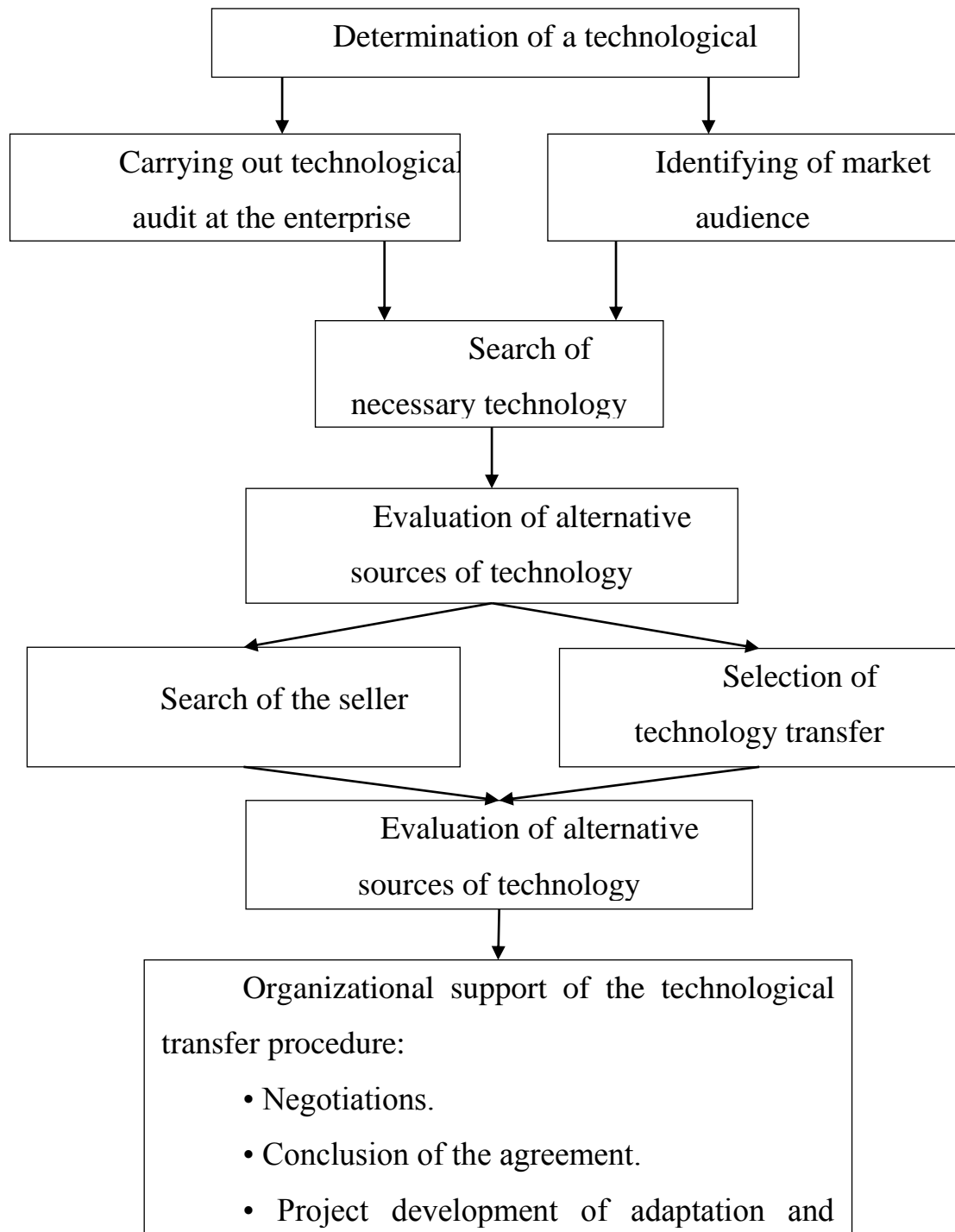


Fig. 2. The sequence of stages of technological transfer at industrial enterprise. Source: own study

Entering into such process at the enterprises requires both organizational and managerial changes and significant financial investments, an opportunity for which in most industrial enterprises in Ukraine isn't present.

An important aspect in the proposed scheme is determination of method how to make a technology transfer, which should be based on an analysis of the technologies of the future strategy for cooperation with its developer, investment opportunities and technical capabilities of the company in the implementation of innovative technologies.

When choosing a method of transfer, it is necessary to understand that the more complex and more large-scale the technology is, the closer cooperation should be between buyer and its creator. As it was noted earlier, the transfer of technologies doesn't end only with supply of equipment. The equipment does not generate new competencies and knowledge by itself. The real innovation in a company can be performed in transfer of knowledge, skills and intellectual property rights.

Summary

The research that was made allowed us to identify a number of theoretical and methodological aspects of understanding technology transfer in the global economy and also a motivational basis for attracting international companies in the technology transfer process.

For Ukrainian enterprises current stage of development is marked as not high level of innovation, as is evidenced by Ukraine's position in the innovative rank European and global level. Therefore in the provided research the transfer of technologies is offered to be considered as a form of innovative development of the enterprise which will promote technological renovation of industry, increasing level of innovation for industrial enterprises, using of advanced innovative solutions of the international level. The researched forms of technology transfer allowed us to choose the most optimal form of transferring at the company considering its potential and strategic goals. To increase the efficiency of technology transfer the organizational model of implementation of this process was created, which marks key stages of transfer that, in turn, allows

you to structure the transfer process, identify organizational opportunities of the company and move to the conclusion of agreements on technology transfer.

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Abstract

Proved the expediency of application of international technology transfer as a form of innovative enterprises. The essence and classification features of the international technology transfer was determined. Differences between commercial and non-commercial transfer of technologies were researched. The main current forms of technology transfer which can be used by the enterprises

were determined. The sequence of implementation the process of a technological transfer at the enterprise was offered.

Keywords

International technology transfer, innovative development, enterprise.