

УДК 330.341.1

COMMERCIALIZATION AND TECHNOLOGY TRANSFER: THE PROCESSES' CONTENTS AND CORRELATION IN THE INNOVATIVE ACTIVITY OF INDUSTRIAL ENTERPRISE

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Філіппова С.В., Ковтуненко Ю.В. Комерціалізація та трансфер технологій: зміст процесів та їх кореляція у інноваційної діяльності промислового підприємства.

Визначено зміст процесів комерціалізації та трансферу технологій у інноваційної діяльності промислових підприємств, представлено розмежування категорій та їх взаємозв'язок.

Ключові слова: комерціалізація, трансфер технологій, інноваційна діяльність, етапи процесу комерціалізації, етапи трансферу технологій, промислове підприємство

Філіппова С.В., Ковтуненко Ю.В. Комерціалізація и трансфер технологій: содержание процессов и их корреляция в инновационной деятельности промышленного предприятия.

Определено содержание процессов коммерциализации и трансфера технологий в инновационной деятельности промышленных предприятий, представлено разграничение категорий и их взаимосвязь.

Ключевые слова: коммерциализация, трансфер технологий, инновационная деятельность, этапы процесса коммерциализации, этапы трансфера технологий, промышленное предприятие

Filyppova S.V., Kovtunenکو Y.V. Commercialization and technology transfer: the maintenance processes and their correlation in the innovation of industrial enterprises.

The contents processes of commercialization and technology transfer in innovation industry, represented by separation of categories and their relationship.

Keywords: commercialization, technology transfer, innovation, process steps, commercialization stages of technology transfer, industrial plant

In modern conditions of cognitive economy the industrial enterprises face difficulties to correspond the market requirements at the appropriate level. Providing the appropriate level of industrial enterprises' competitiveness today is possible only on the basis of innovative activity. The innovative activity of industrial enterprise is based upon certain number of processes that ensure its implementation. Efficiency of innovative activity depends on methods of its results use, in particular through the commercialization and technologies transfer, effective management able to provide innovative development and additional income.

Analysis of recent research and publications

The problem of innovation activity under modern conditions is of high relevance. An intensive investigation of the field in Ukraine, is represented by such scientists: L. Antonyuk, Yu. Bazhala, V. Heyets, V. Solovyov, O. Butnik-Seversky, A. Zagorny, A. Pryimak, S. Stepanenko, and many others. Depending on the direction of researches effected at the innovations newest scientific studies field a variety of approaches to the definition of commercialization and technologies transfer is used, so there exist numerous different definitions of these categories: separate, independent ones and interrelated and even similar, that introduces a confusion in their primacy determination and complicates the search for effective ways of management. Therefore, the content of these processes does require additional researching to distinguish the categories determining their correlation.

The article purpose relates to exploring the definitions of «commercialization» and «technologies transfer» categories on the process approach basis, defining their role in the innovation activity of industrial enterprises.

Main part

The most effective way for industrial enterprise to use its innovation activity results embodies the innovative developments commercialization. Essential number of scientists provides the commercialization definition through process approach. Actually, there exist two fundamental definitions of «Commercialization of research &

development (R&D) and technology», each of them having own manner to reflect the term's essence:

- Commercialization: it is the state-owned enterprise privatization first stage; the managers are responsible for the operations' financial results, meanwhile of that the government ceases providing subsidies to cover losses from economic activity [1];
- Technology commercialization: this is an element of technology transfer, when the consumer (buyer) pays a fee to the technology owner (who may be or may be not its developer); the fees form and amount are determined through agreed contractual terms that does mean obtaining the economic effect from realization of scientific and technological development [2].

The commercialization is a process associated with the practical use of the innovation activities results specific with certain properties, advantages and value for consumers, in order of presenting at the market, gaining commercial effect under profit form. The effectiveness of commercialization is characterized by a steady demand during a long period, in turn providing the enterprise's profit. [3]

The commercialization is the process through which the results of researcher and development activity are in due time transformed into products and services on the market. This process requires an active exchange of ideas and views on both technology and market issues [4]. Results from the commercialization process do bring the advantage not only as investment return in R & D, but also in the form of production increase, improved quality and lowered price thus helping to determine the requirements to the personnel in providing the enterprise's operation at the existing and emerging markets. Often the commercialization represents the main driving force causing the creation and rejuvenation of old industries.

Today the commercialization primarily serves to build a business based on the results of scientific research engaging the technologies authors, where the participation of foreign partners is absolutely not required. Often the scientists treat the commercialization as a process of finding and attracting additional funds for their research continuation. Such viewpoint is cardinaly wrong. The commercialization essence refers to building "a mechanism for money generation," that does mean a business that generates stable financial streams.

Therefore, commercialization can be represented as the process of innovative products positioning to the market, which includes several successive stages, Fig. 1:

1) At the first step we find the estimation and selection of innovation products companies that are most attractive for launching into the market. At the heart of estimates we should lay the knowledge on specific criteria: the innovative product potential, the demand for this product in the society, the demand for the product from the side of potential buyer (in a particular segment of the market), the potential economic effectiveness from the sales (net present value, internal rate of return, payback period etc.).

2) The second step of commercialization process is to attract investors. Only few innovative companies have sufficient money amounts for financing the own developments, so the principal task at this stage is to form the necessary funds.

3) The third step refers to copyright registering for innovations created, their distribution between all stakeholders.

4) The last, fourth stage of commercialization involves the organization of innovation and its introduction into the production process or its further refinements if it necessary.

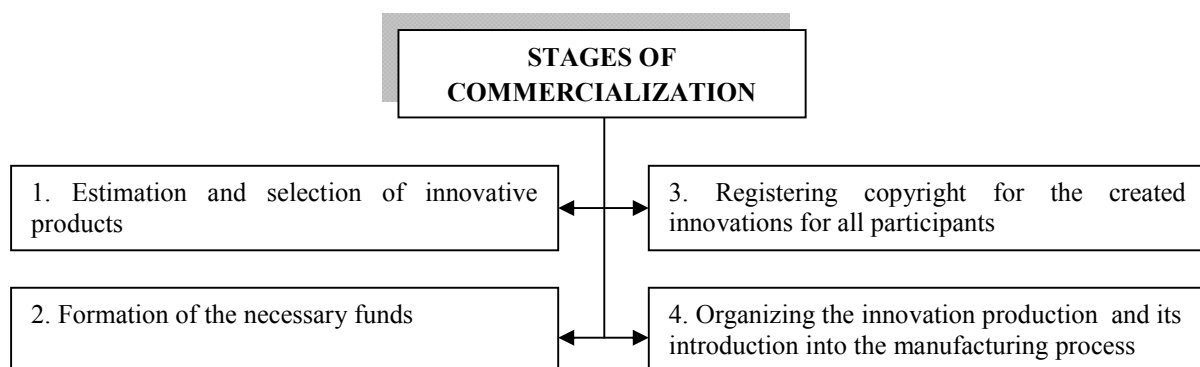


Fig. 1. Stages of commercialization

Another category studied at the theoretical research is «technology transfer», which does not refer to an unique concept.

The technology transfer notion's literal content is «technology transition towards the knowledge application». As in this context the technology factually embodies the information, the transfer herein

represents spreading the technology through information channels of various types: from person to person, from group to group, from organization to organization [5].

Definition of «technology transfer» notion from various sources:

1) The process by which a new idea, design or technology turns into a commercial product that is provided with effective demand [6].

2) The process of using technology, expert knowledge, «know-how» or equipment for the purpose initially never considered by the developer's organization. The technology transfer may have as its result the product / process commercialization or improvement [7].

3) The process by which the existing knowledge, facilities or manufacturing units obtained from public funding for R & D are used to satisfy the public and private needs. [8]

There are three main forms of technology transfer:

1) Internal transfer, when a technology transfer is carried from one entity's unit to another.

2) Quasi-internal transfer, *ibid.* the technology passage inside alliances, unions, associations of independent legal entities.

3) External transfer, representing a process of technology distribution, which involves independent developers and consumers of technology.

Technology transfer from both the seller and buyer involves the following steps [9] (Fig. 2):

- identification of technological needs, on the one hand and of sale object, on the other
- evaluation of costs associated with the acquisition of technologies;
- information search;
- comparison, choices;
- negotiation between buyers and sellers of technology;
- contract and transfer of technology;
- technology using.

The technology transfer is not intending the design sale goal, but only embodies a tool to achieve this goal. It is possible that the development is implemented by the developers, but most part of the development is carried out by a team of researchers, engineers and inventors and further implemented in other enterprises.

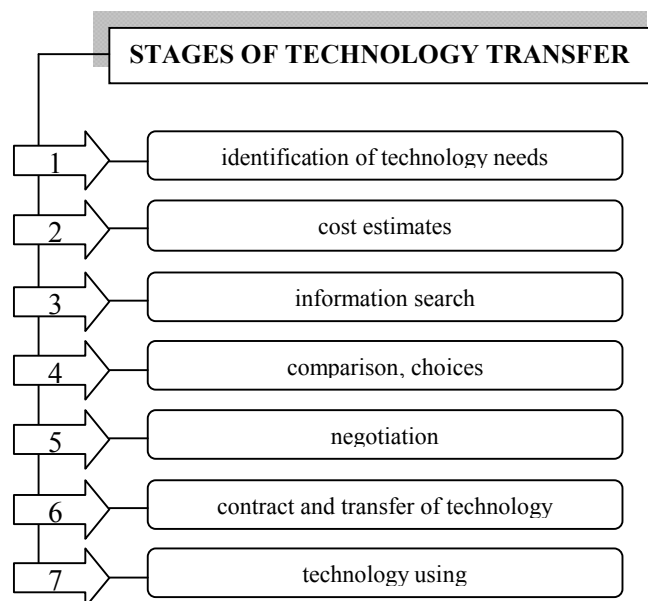


Fig. 2. Stages of technology transfer

It would be convenient considering the technology transfer in the light of human interaction and information exchange during a long period of time.

There are several mechanisms of technology transfer:

1) Exchange of information on conferences, individual meetings, exhibitions, visiting companies on the Internet. Often this initial familiarization is a key to the future close cooperation in case of interests' coincidence.

2) Exchange with personnel, when both organizations will benefit from mutual learning. This form is the initial step in the formation of strategic alliances.

3) Providing services in the technical support field that creates a direct access to customers who could sell the technology.

4) Providing the own, often unique, equipment and facilities for lease; and transfer of experience on working with a technology.

5) Sale of licenses and «know-how».

6) Concluding agreements on various research departments cooperation when it is allowed by law.

7) Works under the contract, *ibid.* by-order research and development in the research departments of companies or governmental laboratories, University, research centers.

8) Creating consortia. Especially widespread are the horizontal consortia when the industrial competitors are jointly use resources prior to reaching the competitive stage of development and research.

One of the main challenges in technology transfer is that the author is convinced that he'll never succeed to bring personally his idea into the final product. The idea will pass along links of chain «theorist – inventor – researcher – practitioner – researcher-engineer – technologist manufacturer – marketer, seller», with some innovative participants: innovation centers and administrations, media, banks, ancillary industries.

The technology transfer involves commercialization of scientific research, i.e. the transfer of new technology (innovation) in commercial use, and dissemination of existing technologies.

A successful technology transfer (TT) up to the product commercialization stage assumes a constant multilevel exchange of information. Using modern information and communications technologies simplifies and enables the exchange with and perceiving of new ideas which are not always clearly designed and formulated. This exchange process is quite chaotic and often come in unexpected consequence of these discoveries. For example, the technology users do reveal an R & D results application scope in the unexpected areas. Synergic efforts of researchers and consumers, difficult to forecasting often have surprisingly pleasant results.

The scientific developments and technologies commercialization is directly connected with the innovative process, innovation activity when the research results and technological development are implemented to obtain commercial effect. Ideally, an interested customer or consumer is paying for research or technology license, from which source the science and developers obtain so much-needed funding.

However, the «science – technology – money», chain as well as the innovation process introduction from the early beginning to just the end, requires a mandatory feedback from the intermediate results and the market, so that the money can only be obtained from the market, and implementing the research results or technology is possible only in the event they being able to enhance someone's competitive advantage, to persuade the end customer in the unique and correct choice and thereby to increase revenue brought by a new product to the seller.

The transfer of technology to business entities may adopt different organizational and economic forms [10]:

— licensing is the most common method of commercial technology transfer carried out in cases where the income from the licenses sale exceeds the cost of controlling the use and lost

profit when loosing the monopoly for the transferred technology in this market. The most commonly transmitted under license are: so-called intermediate generation technology, when that the licensed technology is a commodity only if there exist a formal set of technical documentation that can be certified and reproduced with a given level of product yield;

- transfer of know-how is effected in the form of no-patent license accompanied by certain risks: great risks of disclosing confidential content know-how prior to contract conclusion and know-how dissemination from the recipient to third parties after the conclusion of the contract; irreversible transfer of know-how; constantly present time factor, the uncertainty period of know-how confidentiality (fast development of technology makes publically available the know-how earlier top-secret ones);
- engineering is executed at the user's site effecting a set of design and practical works relating to engineering and technology and required for the new technology implementing: consulting, technological and constructional. There are four basic methods of engineering: standard (consultation when preparing plans and specifications of the project, receiving proposals from contractors and suppliers and in the implementation of the project when the consultant is entitled to act as the authorized representative of the customer), intracorporational, using the customer's own staff, which administers the innovation project, the overall design and sometimes even construction. The role of consultants is limited with assistance on specific aspects of the project in which the customer staff is not enough qualified or has insufficient experience, project management, performance of "turnkey";
- significant amount of technology transferred in the industrial cooperation. Typically, the parties have united to organize cooperative production, carrying out an intensive exchange of technology to achieve this goal. Agreement established between the parties for common interests' period are more important than the direct or reciprocal deliveries (sales and purchase) of products or services and are aimed essentially to the industrial cooperation of mutual benefit. The main reasons for the conclusion of cooperation agreements are: sharing the technical knowledge, finding the best conditions for the production and use of labor, specialization and increase in serial production, finding new markets, reduce production costs, etc.;
- franchise represents the transfer (on commercial terms) of permission to sell someone else's products or provide services in some areas. The growth of the franchise agreement was the result of high market mobility and flexibility of this form of business and technology transfer: for the franchisor (which provides franchise), this agreement allows quick penetration into new

- markets without significant investment, the franchisees (franchise recipient) contract allows starting a new kind of business activity with a lower risk of failure due to support from the franchisor, including the transfer of certain skills, techniques and services as well as assistance and training, for the consumer franchise expands the range of products and services in the local market with appropriate (often guaranteed) brand quality and competitive price;
- lease (finance lease). At leasing transactions involved are the three parties: the lessor, the tenant and the supplier (manufacturer). The lessor serves a specialized leasing company that operates finances and controlled by banks or large industrial companies. The tenant represents an industrial or commercial establishment that rents a mean of production, delivery, and distribution. The supplier is an industrial or commercial enterprise that manufactures or supplies equipment and technology from the lessor to the lessee. The leasing company buys from a supplier the equipment and technology and delivers it to rent for a specified period of time. At the end of the lease term the lessee must return the equipment to the leasing company or buy it at their property at depreciated cost. Tenant signs lease agreement with the leasing company. The leasing contract provides the conditions and the amount of rent payments , currency of payments , commitments and guarantees the maintenance of equipment and proper operation received his refund or redemption at the end of the lease term;
 - technical assistance. Agreements and contracts for providing technical services and assistance are made in two ways: at first they represent the main subject of the agreement, and at the second they embody a section included in the agreement on the transfer of technology or supply equipment. A key feature of technical assistance contract is that its subject is an "elusive" product : technical services, researcher activity, education and training, but there are elements of engineering services, contract work, contracts for rental equipment and tools;
 - creation of joint ventures. If some interested partners from different countries want to join efforts and expertise in the manufacturing of new products for this market, share common risk, they have no better way than to create a joint venture. No other forms of cooperation does not provide the participants a high degree of interest in the final success of the project;
 - promoting the governmental cooperation in science and industry. This does often take the form of equity financing specialists (researchers, professors, graduate students, undergraduates and graduate students) to solve technological problems of enterprises.
- According to the legislation of Ukraine, the technology transfer (transfer of businesses to new technologies) can be effected also through the conclusion of such agreements [11]:
- the industrial technology supply, concluded for the acquisition of knowledge, experience and the acquisition of technological equipment;
 - technical and industrial cooperation, concluded for the purpose of acquiring knowledge and receiving services for industrial production, intermediate goods, equipment and components that meet the conditions of the application technology, and other components necessary for its implementation;
 - providing technical services, concluded to provide services in planning, developing research programs and projects, as well as carrying out or providing special services required for the production of certain products;
 - engineering activity, in the field of works and services , including drafting terms of reference of the pre-project activities, including feasibility survey and engineering survey works related to the construction of industrial, warehouse and other facilities used in the technological process of production, research, development proposals, technical and design documentation regarding technology and its components, providing consultation and supervision during installation component technologies and commissioning, consulting economic, financial or otherwise, associated with the use of technology and with these works and services;
 - joint venture creation, in the case of partial transfer of property rights to technologies and their components;
 - contract about renting or leasing technologies components and equipment;
 - commercial concession (franchise).
- However, apart of technology transfer agreements there can be concluded, in particular, the contracts regarding:
- guarantees of persons submitting technologies and their constituents about the possibility of achieving economic indicators and production of products, the use of these technologies , and components;
 - contracts of complex engineering, environmental or other works, necessary for application of the technologies and their components;
 - contracts for maintenance of equipment.
- Determining the relationship of commercialization and technology transfer processes based on study of these processes existing definitions and their contents led to the following conclusions:
- innovative activity of industrial enterprises does not always end with technology transfer, but can be completed with its commercialization;
 - technology transfer is not always completed with its commercialization;
 - technology transfer is an intermediate stage of innovation activities and the commercialization represents their final.

Conclusions

Thus, technology transfer and commercialization are relatively independent processes and can exist at an innovative enterprise both separately each from

another and together. If both processes occur at the industrial enterprises innovation activity, the technology transfer is always preceding to the commercialization. In this case, namely in the result of technology transfer the successful commercialization opportunity appears.

Thus, the study and comparison of commercialization and technology transfer categories'

definitions allows to find meaning and relationship of these processes in the innovation activity of industrial enterprises, but there exist certain factors that determine the presence of these processes and appropriate control methods, that should be defined through further investigation.

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Надано до редакції 06.05.2013

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Посилання на статтю / Reference a Journal Article:

Commercialization and technology transfer: the processes' contents and correlation in the innovative activity of industrial enterprise [Електронний ресурс] / S.V. Filyppova, Yu.V. Kovtunenکو // Економіка: реалії часу. Науковий журнал. – 2013. – № 2 (7). – С. 33-38. – Режим доступу до журн.: <http://economics.opu.ua/files/archive/2013/n2.html>