DISCUSS ABOUT THE SCIENCE-TECHNOLOGY MARKET

Xuan Minh
National Instutute for Science and Technology Policy and Strategy Studies

Abstract:

The consideration if the products of scientific research are commercial commodities needs to be based on the historical evolution and development. In reality, the science-technology itself is experiencing intensive changes to bind closely fundamental research and applied research. As result, the products of scientific research get the properties of goods and the market relation gradually gets established in scientific research activities.

The study of the commercial status of products of scientific research and the existence of the science-technology market has not only the poor research purpose but also relates to important purposes of practical application. One of the main problems is related to the set up of the legal environment suitable for exchange of products of scientific research and management methods to be applied for various fields.

Actually in Vietnam we are discussing about the existence of the science-technology market or the technology market. Not only the intellectual community but also the official legal documents keep the different views on this matter. While the Science-Technology Law promulgated by the National Congress on 8 June 2000 at the 7-th Session uses the term "the technology market" (Article 33 of the Law), the Party documents still use the term "the science-technology market".

The discussion of the terms of "science-technology market" and "technology market" is devided into three groups of views. The first group states that there exists only "the technology market" because the science cannot be the commercial good. The second group pretends that there is no big difference in the naming. The way we call them is quite conventional. The third group confirms the existence of the science-technology market and the science can be a commodity for commercial exchange.

From historical view, we can see the necessary conditions for appearance of certain types of commodities and markets. There was the time the consuming commodities were not commercial goods. Only when they became goods the market of consuming commodities appeared. The similar situation is observed

for labor forces, lands and many other things. The consideration if the products of scienctific research are commercial commodities cannot be based on the examples from the ancien time (namely the famous example of the Newton Laws which are most referred as impossible to be sold or purchased). Our consideration of the matter should be based on the historical evolution and development.

In practice the science-technology itself is experiencing the strong changes for fundamental research and applied reseach and then the science and the technology are closely linked for mutual existence and development. The new trend appears and researchers propose the new concepts of "technologization of sciences and sciencialization of technologies", "semi-science and semi-technology", "symbiosis of poor sciences and applied sciences", "Jefferson-type sciences" or "applicatization of fundamental sciences and fundamentalization of applied sciences" and some others[1] [1].

The main concrete ideas are behind these new concepts, namely:

- Modern technologies are completely based on scientific theories and concepts. At the same time the modern sciences are pushed up thanks to modern technical equipments;
- Fundamental research plays the important role in the renovation of advanced technologies. It helps to select properly the technologies required for scientific research among abundantly available technologies. Robert Galvin, Motorola Ex-Chairman-CEO pays serious attentions for setting up the "technological road-maps" which let big corporations define their technological strategies. These road-maps describe the future renovation of technologies which are seen as possible and promising from the present view of sciences. They help also identify the most potential technologies for development. Another example comes from the time of the years of 70s and 80s of the last century. Ralph Gomory, IBM Research Director, had set up research teams specially in charge for collection of scientific knowledge necessary for the company to get modern technologies. The research teams recommended IBM to remove Josephson super-conducting circuits which were the solution to substitute the traditional use of siliceous semi-conductor circuits;
- Fundamental research and applied research are well combined for unified objectives. Only a few disciplines (such as molecular physics, space sciences and poor mathematics) can identify their research programs without paying attention to socio-economic application

[1] See: The UNESCO Herald, May 1999, p.10

afterwards. In general, the fundamental research has to be oriented to create products or knowledge which would bring back high benefits or values for the society. At the same time the applied research provides the fundamental research with new tools for stronger advancements;

- Fundamental research and applied research are unified in their short and long vision of interests. In short term vision, some results of fundamental research are not sure to lead to the renovation of technologies. But in long term vision the advancement of technologies cannot be continued without being supported by the knowledge provided by the fundamental research;
- While keeping the traditional deep research of the material nature the fundamental research today comes close to and enters the world of the applied research through the multi-direction, multi-face and multi-purpose development. Today the fundamental research gets close to the applied research and, in the inverse direction, we see the trends to "fundamentalism" the applied research. The recently emerging science-technics disciplines, while keeping its technical orientation, gradually become the fields of fundamental and theoretical research;
- Fundamental research and applied research are components of a continuous and interlinked process and many borders between them seem very dim. From one side, as outstanding success of fundamental science research, the discovery of enzymes to cut and to link ADN nucleotides is the result of the hunger to understand the way the cell operates at molecular level. From another side this discovery creates the crucial technologies which give birth to new biological technologies. Similarly, it is not easy to give the exact definition of nano technologies. Some nano technologies, in fact, turn not to be really at nano level. They operate at micro level which is 1000 times bigger. In some cases the nano technologies turn not to be technologies because they link to fundamental research of structures. Another example can be cited from the field of communication. In fact, the use of laser in communication requires the manufacture of high quality optic fibers. The latter requires the huge research works related to defects of glass impurities for very actual purposes of application.

The above mentioned changes lead to the appearance of commercial products and market relations of products of scienctific research. From this point, producing enterprises start paying interests to products of scienctific research. In field of biotechnologies, for example, the achievements made in research of living cells and genetic structure were, in the old time, simply related to poor biological science. But now they become very fast the

desired targets of phamaceutical companies who want very much to make huge investments to produce expensive drugs or diagnostic equipments.

Then there appear the providing sources of products of scienctific research which are commercial market oriented. Not only the activities of technological development but also the one of fundamental research are conducted in laboratories of technologically oriented companies. Many private industrial enterprises get involved into fundamental research. Their arguments are very faire: if the enterprise pays for a scientific discovery through its investment for researchers then it has rights to get it back from clients who use the achievements made from this discovery.

In reality there exist some products of scienctific research under private ownership. In field of information technologies, for example, the mathematical formulas which are very abstract and have no way to fall under private ownership now become the resources for privately owned assets through information processing operations by super computers and complicated computing algorithms.

Actually the relations in scientific research are very close to the relations in business market. The scientific fields turn to be very close interlinked. The intervention of businessman into research activities leads to the removal of traditional borders between research communities. The number of research programs and projects developed by multi-discipline teams of researchers gets increasing. There exists not only the cooperation between researchers of natural sciences but also between researchers of natural sciences and technological sciences to create new solutions for production process, and then together they are to push up the links between the natural sciences, the technological sciences and the social sciences. These links provide not only the guiding orientations but also ensure the sustainable relation between the science and the production process.

In practice there are some emerging tendencies to revise the border line separating the "scientific discoveries" (impossible to be patented) and the "technical invention" (possible to be patented). The background of this requirement or revision is the today's short way from a scientific discovery to a technological product which can bring huge benefits.

In addition, actually the science has the shape of an economic sector. The science gathers already the necessary components to form the so-called "scientific workshops" and "scientific plants". They have their producing lines to provide industrial producers and businessman with scientific products[2]. The operational process of science as economic sector seems to

[2] See: Social Science Information Institute, Research Service Documents, TN 2002 - 78-79, p. 4.

fit the historical experiences. Namely, when a new element appears as producing force it would lead to the appearance of a new economic sector. This experience is seen clearly through the fields of industries, commerce, banking and etc. At this point we can agree with the point of view that the fourth labor division starts. Its particularity is the separation of the scientific research activities from the producing system to become an economic sector.

Therefore the consideration of the commercial commodity status of products of scienctific research and of the existence of a science-technology market should be based on the actual context of strong development of sciences and technologies and their relation to production activities. At the same time the particularities of commercial commodities and market of these new entities should be assessed in actual aspects, relations, bounderies and levels.

As commodities and market in general concepts, the products of scienctific research become commercial commodities and the appearance of science-technology market is the objective phenomena, beyond our subjective desires. At this point it is not suitable to make a discussion of the type which stipulates "it is very dangerous to consider the products of scienctific research as commercial commodities". However, it is necessary to identify clearly the usefulness and the defects of this kind of commercial commodities to set up the suitable management mechanism. Therefore the study of the commercial commodity status of products of scienctific research and the existence of the science-technology market has not only the poorly academic sense but also a very important pratical value.

In order to promote the changes, *first of all*, it is necessary to set up a new suitable legal environment for exchange of products of scienctific research. The participation of private organizations in the field of fundamental research makes strong impacts to the existing legal system. Simon Cohen, expert of legal matters of Patent Laws from London based Taylor Johnson Carrett Firm says: "In practice, in some fields such as genetic technologies and information technologies the differences between technological inventions and scientific discoveries have no value". This point of view is shared and supported largely by the courts of industrialized countries. For example, the American and European patent agencies have patented the discovery of chemical sequences which are the background of the genetic system of the human race and animals considering them as "important finding" (they have been made public in prestigious scientific journals). The courts reserve only the remark that this knowledge must be proved to have the potential commercial value - the thing not being difficult to be confirmed because, for instance, they are known to be related to breast

cancer. The courts are also favorable to issue patents to mathematical algorithms.

Second, it is necessary to have a proper management system for every field of sciences. For the fields of sciences which are experiencing the big turning-point such as bio technologies and information technologies it is necessary and possible to set up the market mechanism based management system. The system will govern the research activities including the essential matters such as what to study, how many to invest and how to conduct the research.

Third, during the implementation of transfer of the operational status of research institutes to market mechanism the shift concerns not only the field of applied research. The fundamental research divisions having the possibilities to commercialize their products of scienctific research can be also considered for transfer to the new status. This policy had been implemented during the Chinese reform of research institutes.

From another side, the fact that the products of scienctific research become commercial commodities does not mean the removal of the State roles and functions. Many governments are active in their large investments for fundamental research to meet the development requirements. The investments from the Government and the private sector are here to compensate each other.

Fourth, the proactive attention should be taken to prevent the negative aspects in scientific research. There appear the trends to turn the products of scienctific research to privately owned assets, to rush to huge benefit generating research projects despite moral aspects, to prevent the free information circulation under cover of confidential practice. It is impossible to deny the serious consequences of these practices[3]. They must be considered as negative sides of the market mechanism and the market based solutions should be taken to settle them.

Therefore it is necessary to accept the concept of science-technology market. The difference between the science-technology market and the technology market is real and is not limited in wording way. This difference should be taken to account for assessment of practical problems.

---

[3] For example, the "confidential practice" (researchers in neiboughring laboratories do not want to discuss the findings. This situation creates the silence covering universities) is the topic of a recent workshop held by Massachusetts Institute of Technologies and the American Asxsociation for Scientific Progress. During the workshop some points of view had gain attention. Fo example, Alan Goldhammer from the Organization of Bio Technological Industry declared: “Part of the problem is the consequence of the fact that there are some researchers think to be rich very soon thanks to God. John Deutch, former Director of a scientific department of Massachusetts Institute of Technologies considers that the confidential practice is a big threat to science. It goes against the objectgives and the reason for existence of universities.

REFERENCE

1. Le Huu Nghia, Pham Duy Hai. (1998) *Scientific thinking in the time of the science-technology revolution*. The National Political Publishing House, Hanoi, p. 101.
2. *Learning based economy and innovation policies*. Science-Technics-Economy Summary Report, No. 12/1999.
3. *Technology and Development Management.* Science-Technics-Economy Summary Report, No. 1/1999.
4. OECD Secretariate. (2002) *Toward to the knowledge based economy: recent trends and policy orientations of OECD.* Report at OECD-IPS Workshop of "Promotion of the knowledge based economy in Asia", Singapore, 21-22 November 2002.
5. *Invention and Innovation: Trends and Challenges for Policies.* Science-Technics-Economy Summary Report, No. 12/2005.