

ROLE AND IMPORTANCE OF TECHNOLOGY TRANSFER

S. Andonova, S. Popovski

GTZ Technology Transfer Project

German – Macedonian technical cooperation

Apostol Guslarot, 40, 1000 Skopje, Macedonia

gtztechno@on.net.mk

Abstract: The technological development is a key factor in the economical development of one country and is based on the opportunities to generate new innovations and adopt new technologies, which is a process of transfer of technologies. The role of the university as a source of new technologies and knowledge and in creating conditions for effective transfer of technology, which includes creating institutional infrastructure is big.

Key words: innovations, innovative politics, technology, transfer of technology, technological infrastructure, center for transfer of technology

1. Introduction

The last century, as a termination of the Millennium, was a period in which began one of the biggest process of human development and innovation. Simultaneously, the last Century presents a time period of the biggest human clashes and disappointments, also contributing to the humanity urge for the continuous progress without any radical and short-term variations.

After facing the consequences of the destructions of the two World Wars, the normal process for reconstruction and re-constitution began, which divided the World into two spheres each contributing to the general development in specific way. So, humanity witnessed the first steps of the Space conquering, the peaceful use of nuclear energy, explosive industrialization and development of some parts of the Globe (USA, Europe, Japan, ..), computerization and maybe the most popular invention – the Internet.

This process created by itself several nucleuses of the knowledge, know-how, innovations and ideas, mainly concentrated in few zones. Initially, the output, expressing the idea of the invention as a confidential and private way to success, was strictly towards users not too distant from these nucleuses. But, this process contributed to another division of the World: *developed*, covering very small

area, and *underdeveloped*, covering the rest of the world. As the humanity began to realize its undivided destiny, it began to think that the process of development must be global instead of local. Also, another process started, the process of the markets unification and growth, avoiding the saturation and self-destruction. However, the need to spread the development must not be understood only as a process of moving between the developed and the non-developed. The spreading of development has to be considered as a dialectic process, establishing the relation within the developed and native surrounding.

These two opposed, but goal-oriented processes, shared the idea that, in order to develop, one must *disseminate*. Therefore, one of the first things to share were the *knowledge*, the *ideas*, the *innovations* and the **technology** as a “path from the input to the output”.

Then, the question arisen was “How”? How to disseminate knowledge, ideas, innovations, and technology in a most effective way?

During the last twenty years, industrial companies have realized that they can (and must) improve the efficiency by which they introduce new technologies into their products. By actively managing technology transfer, companies reduce the time scale and cost for introducing the new technology, which leads to more competitive products. Technology transfer takes the form of a commercial agreement between two companies - the *donor* and the *recipient*.

From the European perspective, *technology transfer* reduces duplicated research. It cuts the long-term cost of research by re-applying the results elsewhere. In addition, technology transfer exposes the technology to outside commercial markets, thereby allowing the companies to inject their own expertise back into the system. However, the major reason for Europe to support this process is the expected 'spin-off' into terrestrial applications. For a relatively small investment incremental, this spin-off can be significantly enhanced, that is what the industries in the Member States expect.

2. Technology transfer

Technology transfer is a process of taking innovations from one domain and applying them to another. Also **technology transfer** is the process by which technology, knowledge, or information developed in one organization, in one area, or for one purpose is applied or used in another organization, or area, or for another purpose.

The technology transfer is usually done by some institution using one of the two methods:

- direct access
- through centers or incubators

During the support of its own mission, the technology transfer has developed a set of four primary goals:

- *Encourage and assist faculty members, staff and students* to consider alternate applications of technology developed as a part of their research activities;
- *Develop an effective and efficient technology transfer program and assess, document and communicate the full value of technology transfer activities;*
- *Increase R&D income to faculties, from public and private sources, by utilizing various technology licensing and research funding strategies; and finally*
- *Enhance economic development in the region and in the State* by building strong ties between the public and the private sectors.

In the last few years, the university (faculty) staff and the students are more interested to see their research results having reached the marketplace through starting a new, private company, rather than the traditional way of licensing the technology to an existing company. The technology transfer staffs is prepared to assist in this process by offering the following services:

- **Identification of commercialization options.** Through an initial meeting and follow-up, the *technology transfer office* staffs learn about the business opportunity and discuss various ways to move it forward. *Technology transfer office* staff present and discuss the attached Checklist of issues for a start-up company at FSU.
- **Business opportunity analysis.** Following an agreement to work together, *technology transfer office* staff will work with the researcher in order to understand the research background and its applicability to particular markets. A *Business Opportunity Document* will be prepared, which (in 1-2 pages) describes: a) the opportunity (how the products will make money); b) the technology; c) the intellectual property situation; d) the products/services arising from the technology; e) the markets; f) the commercialization process; g) and the next steps.
- **Preparation of a Commercialization Plan.** A brief document outlining the reason why a start-up company is appropriate, how the ownership might be apportioned, the legal incorporation of the company, the company site, the financing of the company, the *Business Plan* preparation, and the company management.
- **Dealing with the university:** The *technology transfer office* staff can assist researchers to address and resolve the following issues:
 - Internal FSU sign-off/information to appropriate administrators;

- How to provide a portion of commercialization proceeds to all parties who have such an expectation - students, other faculty, the university;
- FSU may have an interest in the intellectual property through policy or prior funding. This needs to be resolved and documented in an agreement;
- Structural relationships with FSU - is FSU going to hold equity, is the company going to launch initial activities, while housed at the university, technology transfer into the company, etc.?

3. Technology Transfer Approaches

The explanation of the meaning of technology transfer gives no explanation of the process how it actually works. In general, two different approaches can be distinguished:

- the *direct* approach and
- the approach of *incubators*.

3.1 Technology transfer through *direct approach*

The direct approach encompasses existence of a *Technology Transfer Institution* – TTI (Center, or Office, or Agency, or Bureau). This is an institution, which works under the market principles by offering services as a product.

The services which are more complex as their description in words explain can be:

- information
- financing
- technology consulting
- networking
- qualification
- education & training

Information, especially in this era means not only the supply of the latest news in every era but also developing of the information relation between the donor and the customer. The task of the TTI is to make the selection, way, range, etc. of the supply of the information served to the one who demands it through the TTI. This is especially accountable for the SME whose organization and dimension usually gives no chance for specialized department for this area.

Financing will be considered as a method of connecting the proper business ideas with the possible sources for financing. It is a task of the TTI to make the selection and screening of the ideas and to establish it's own interest for their realization. Of course from the success of this process the further general success

of the TTI will be dependant. Furthermore, it is the process of the connection of the selected ideas to the sources for financing which can vary in their relation to the client. It is also a typical TTI activity to select the proper financing source which can be: grant, loan, credit, leasing etc. and not every one is suitable for the subjected business idea.

Technology consulting is a process which was basically explained previously and it is a liaison between the technology owner and the one who needs it as a part of it's progress and development. The task of the TTI should also be to connect the exact source to the client of the agency and to interrelate it to the other tasks of the Institution.

Networking should be considered as a creation of system of liaisons for direct and non-disrupted flow of ideas, information, know-how, etc. through the TTI.

Qualification is a process of competing to achieve certain criteria for reaching a certain level. Usually it is a new market especially when addressing to SME. It's a TTI job to be aware of these criteria and to distribute the information and knowledge of the paths towards qualification. It can be product or customer oriented process, but strongly supported from one TTI.

Education & training is the last, but not the least in these descriptions. This is a process, which is extremely important especially for the personnel of the SME that by it's position can strongly influence the success of the enterprise. SME possess rapid productive mobility and therefore there is no one strong and sustainable way of their staff education and training. Also, involvement in this process is usually connected with increase of responsibility, commitment, satisfaction of the addressed staff. The process itself, offering enormous possibilities developed in recent years is a opportunity for the engagement of a specialized TT Office.

3.2 Technology Transfer through *Incubators*

Technology transfer through *incubators* is an *approach* widely dispersed throughout the world, both in developed and underdeveloped countries. Basically, it is a method of creating an appropriate environment for the start-up and small companies. It is the idea and the possibility of commercial technology development, which counts as essential requirements for the companies to start their own life into these incubators.

The idea origins from the advanced Universities and their academic personnel, which, supported by the indiscriminately legislative, started this incubators to promote their ideas and the business ideas of the students. The incubators are places of defined ownership, with support to the start-ups in the form of free water supply, electricity, space, accounting etc., all based on market philosophy.

The companies are severely screened through developed selection system, often created by the University professors who, participate in the incubators as a share or stockholders for a limited period of time. The municipalities are involved in the incubator thus creating a proper climate for the employment of the new-coming academic citizens and locally migrating working force.

One of the essential requirements, i.e. “condition sine qua non” is the provision of Risk Capital, which is founded in order to be used as a fast reaction source and is necessary for enterprises, such as the *start-ups*.

The idea of the firms to be founded by an incubator ground in Europe, providing thousands of new jobs, business interest at the banks and at the Universities, and therefore it is a process, which is starting to explore globally.

4. Technology Transfer Centers

4.1 General for Technology Transfer Centers

What is Technology Transfer Center?

The new technologies, fast IT-communications, opening of the European market, the structural and economic changes, the effects of international and global competition etc. are some of the factors which led to the need of establishing *Centers for Technology Transfer (TTC)* (or Technology Transfer Centers).

Historically, departments and structures of some governmental and non-governmental Institutes or Organizations were responsible for activities, which are now belonging to the portfolio of the modern technology transfer centers. Today, the implementation of new technologies in practice is the main goal of the technology transfer centers.

Usually, the TTCs are founded as a part of the structure of Universities, with the main goal to strengthen the links of University with the industry, in order to support the economical development of the region.

As already mentioned forehead, one of the main reasons to establish a *technology transfer center* is to support the economical development of the region, which includes: new start-up companies, new employments, introduction of new technology, increasing of investments etc.

In the following subsections, the *assets*, the *objectives*, the possible *partners* and the common *activities* of a *technology center* (or technology transfer center) will be shortly described.

4.2 The Assets of Technology Transfer Centers

The main *assets* and *sources* required for establishing a technology center are the following:

- VISION,
- Great common will to improve for the future,
- A Technical University,
- Well educated people and
- Regional consensus.

Having these already available, it is clear that the success of the idea to establish a technology center (TTC) depends a lot on the enthusiasms of the relevant factors, but not on having strong investments. In addition, in order to establish a TTC, the existence of a Technical University, as a main source of high-educated people, is crucial. The students even are motivated during the study to direct their research efforts in projects closely related to the industry of the region. This nevertheless creates better condition for the students to start running their own businesses after the completion of the study.

4.3 The *Objectives* of Technology Transfer Centers

In general, the *objectives* of a technology transfer center are the following:

- Technology transfer;
- Regional development with economic success;
- Networking;
- Incubator for start-up companies;
- Implementation of structural changes into technology-oriented industries;
- Creation of new industries;
- Generation of new employments;
- Targeting of a sustainable future;
- Becoming a leading economic and technological region
- Promoting cross-border co-operation

4.4 The *Partners* of Technology Transfer Centers

The finally indispensable part for creating TTC is *The Partners*:

- The Technical University;
- The Regional Chamber commerce;
- The Community of the Region;
- The Saving Bank;
- A private insurance;
- The other Communities and regional administrations of the Region;

From the above illustration, we can see that part “Partners” look for more : patience, permanently communication, perfect organizations, team works and equation of all individual attitude. This is one long process, which can be created with

lots of hard working, and common will with assistance of the Municipality and Banking system.

4.5 Activities of Technology Transfer Center with the *Start-ups*

4.5.1 The Welcoming package

The **Technology Transfer** Center is a source of benefits for young start-up companies. As shown in Fig. 2, young companies in the Center are enjoying many advantages:

- ***Central secretarial services:*** 24 hour service for all companies. This will be helpful, because all of the owners will be provided by fast information, network-connections and permanent contacts with the customers. This kind of service is saving money, because the secretary will be common for few companies;
- ***Free office space:*** for a low rent, the start-ups can use office space and necessary equipment;
- ***Access to ISDN-lines, fax- and Xerox machines and access to Internet and Ethernet:*** the *start-ups* in the Center will be provided with telecommunication infrastructure, and common fax and Xerox machines could be exploited by few companies (for example one on each floor of the Center). This is also saving.
- ***Access to conference facilities:*** the following facilities could be available for free in the Center:
 - *Conference hall* for seminars, conferences or meetings,
 - *Presentation and moderation equipment* (computer, LCD projector, tables, boards etc.),
 - *Organization skills.*
- Contacts with Chamber of commerce, with local authorities, research institutions and with consultants, with business groups.
- As a member of the Center, the start-ups have a great support (by the managing board) in establishing contacts on high-level ministries, chambers of commerce, powerful business groups, research & developing institutions etc.

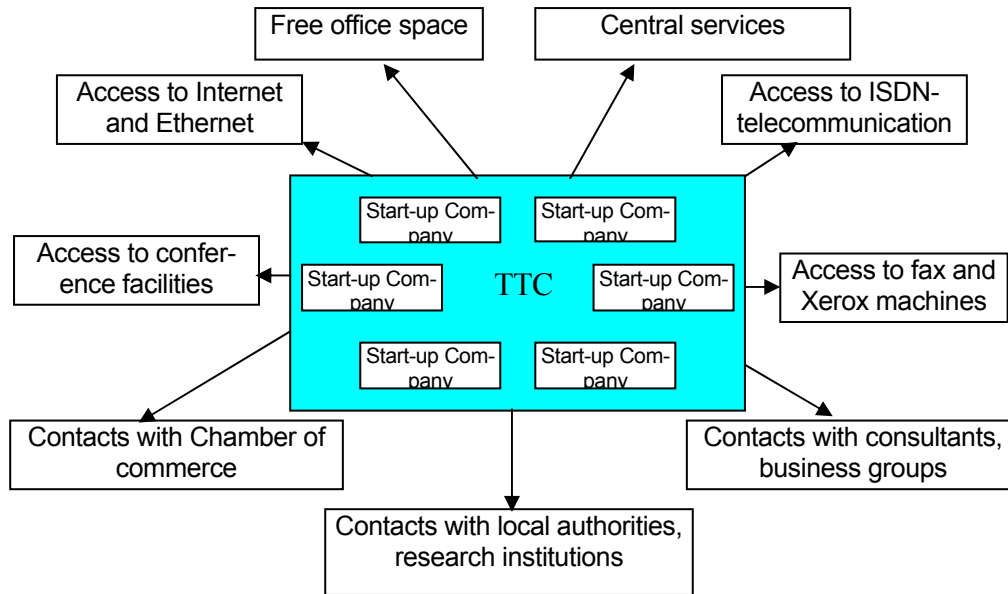


Figure 1: Plan of *Welcoming Package* in the Technology Transfer Center

4.5.2 Communication with the Municipality

Beside the *Welcoming package*, the *communication* within the municipality is made simple for the companies in the Center, so that new contacts can be established easily with the

- Local and Foreign Academic partners;
- Local and Foreign Industrial partners;
- Governmental and NG Organizations;

4.5.3 Benefits from Technology Transfer Centers

For the companies in the Center, the following *services* could be offered additionally:

- Networking (with other technology centers);
- Cooperating with foreign technology regions;
- Consulting services;
- Internal and external communication;
- Quality management system;
- Education and Training;
- Programs & Projects Coordination;
- Other services;

5. Conclusion

In the concept of technological development of a country, creating opportunities for generating innovations and adapting new technologies is crucial. Meanwhile, the existence of proper institutional infrastructure is necessary as a base for effective transfer of technologies or use of the research data as practice. In the creation of the technological infrastructure, the university has the biggest role as a source of knowledge and new technologies.

6. Literature

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