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# Technology Transfer Guide – Bulgaria

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# KNOWLEDGE AND TECHNOLOGY TRANSFER (KTT)

## Contents

# A) KNOWLEDGE AND TECHNOLOGY TRANSFER SPECIFICS

## *Definition and scope of KTT*

*Knowledge transfer* (KT) is the practical problem of transferring knowledge from one part of the organization to another. Like knowledge management, knowledge transfer seeks to organize, create, capture or distribute knowledge and ensure its availability for future users.

*Technology Transfer* (TT) is the process of transferring skills, knowledge, technologies, methods of manufacturing, samples of manufacturing and facilities among governments or universities and other institutions to ensure that scientific and technological developments are accessible to a wider range of users who can then further develop and exploit the technology into new products, processes, applications, materials or services. It is closely related to (and may arguably be considered a subset of) knowledge transfer. Edwin Mansfield, the noted American economist, makes a useful distinction between vertical technology transfer and horizontal technology transfer: *"Vertical technology transfer occurs when information is transmitted from basic research to applied research, from applied research to development, and from development to production. Such transfers occur in both directions and the form of the information changes as it moves along this dimension. Horizontal transfer of technology occurs when technology used in one place, organisation, or context is transferred and used in another place, organisation, or context."*

The Draft International Code of Conduct on the Transfer of Technology that was negotiated under United Nations Conference on Trade and Development (UNCTAD) auspices between 1978 and 1985 defined technology as the systematic knowledge for the application of a process that results in the manufacture of a product or the delivery of a service. Technology is not a finished product or service as such, although it can be critical for its delivery or performance. Technology does include the entrepreneurial expertise and professional know-how to deliver products and services (UNCTAD, 1985).

Similarly, Burgelman et al. (2008) propose, "technology refers to the theoretical and practical knowledge, skills, and artefacts that can be used to develop products and services as well as their production and delivery

systems. Technology can be embodied in people, materials, cognitive and physical processes, plant, equipment and tools."

Based on the above definition of technology, the Code defined transfer of technology as "the transfer of systematic knowledge for the manufacture of a product, for the application of a process or for the rendering of a service and does not extend to the mere sale or lease of goods". From this, five categories of transactions could represent transfer of technology as follows:

- The assignment, sale and licensing of all forms of industrial property, except for trademarks, service marks and trade names when they are not part of technology transfer transactions;
- The provision of know-how and technical expertise in the form of feasibility studies, plans, diagrams, models, instructions, guides, formulae, basic or detailed engineering designs, specifications and equipment for training, services involving technical advisory and managerial personnel, and personnel training;
- The provision of technological knowledge necessary for the installation, operation and functioning of plant and equipment, and turnkey projects;
- The provision of technological knowledge necessary to acquire, install and use machinery, equipment, intermediate goods and/or raw materials which have been acquired by purchase, lease or other means;
- The provision of technological contents of industrial and technical cooperation arrangements (UNCTAD, 1985).

Therefore, a technology transfer system involves three important components:

- Organisation direction and capability – today the companies must be able to be constantly innovative in order to maintain or improve their position in the market. In order to achieve this, they must know how to identify the innovation needs of a business problem. Thus, in order to identify their needs, they usually perform a technology audit, i.e. investigation aiming at the evaluation of the a) technology capacity, b) procedures, and c) needs. Furthermore, they identify the strong and weak points through the characterisation and general assessment of the firm's basic know-how;

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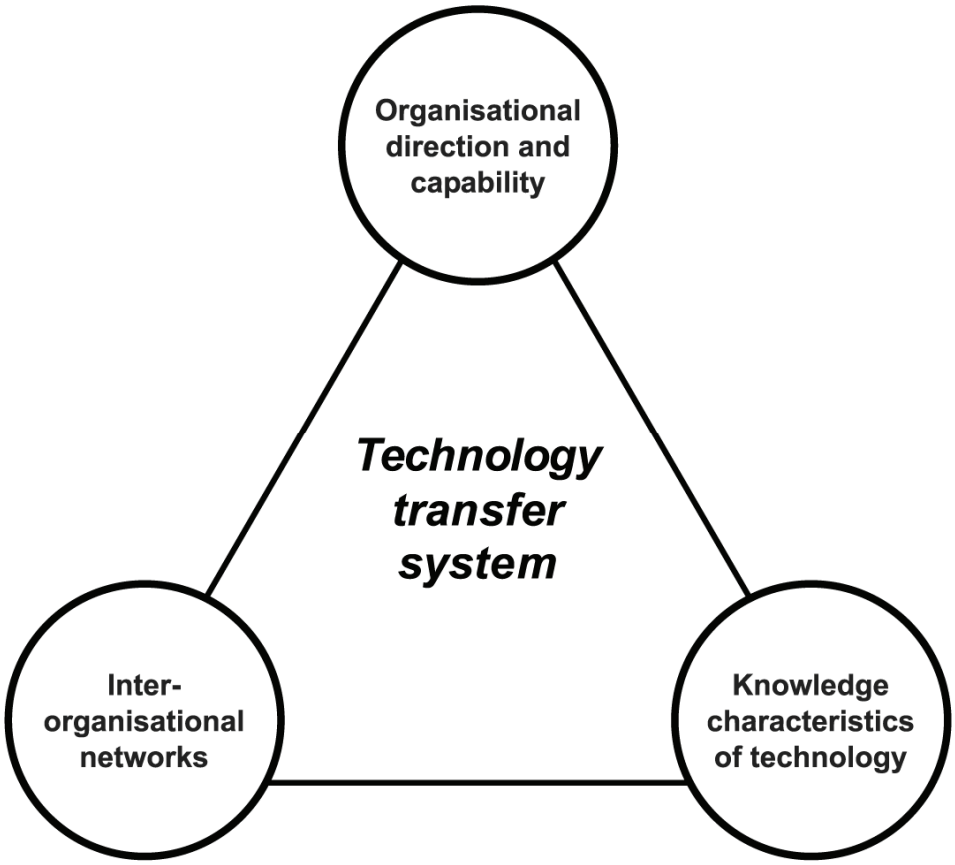
- Inter-organisational networks – companies, public authorities, universities, technology transfer centres, business supporting organisations and networks;
- Knowledge characteristics of the technology to be transferred.

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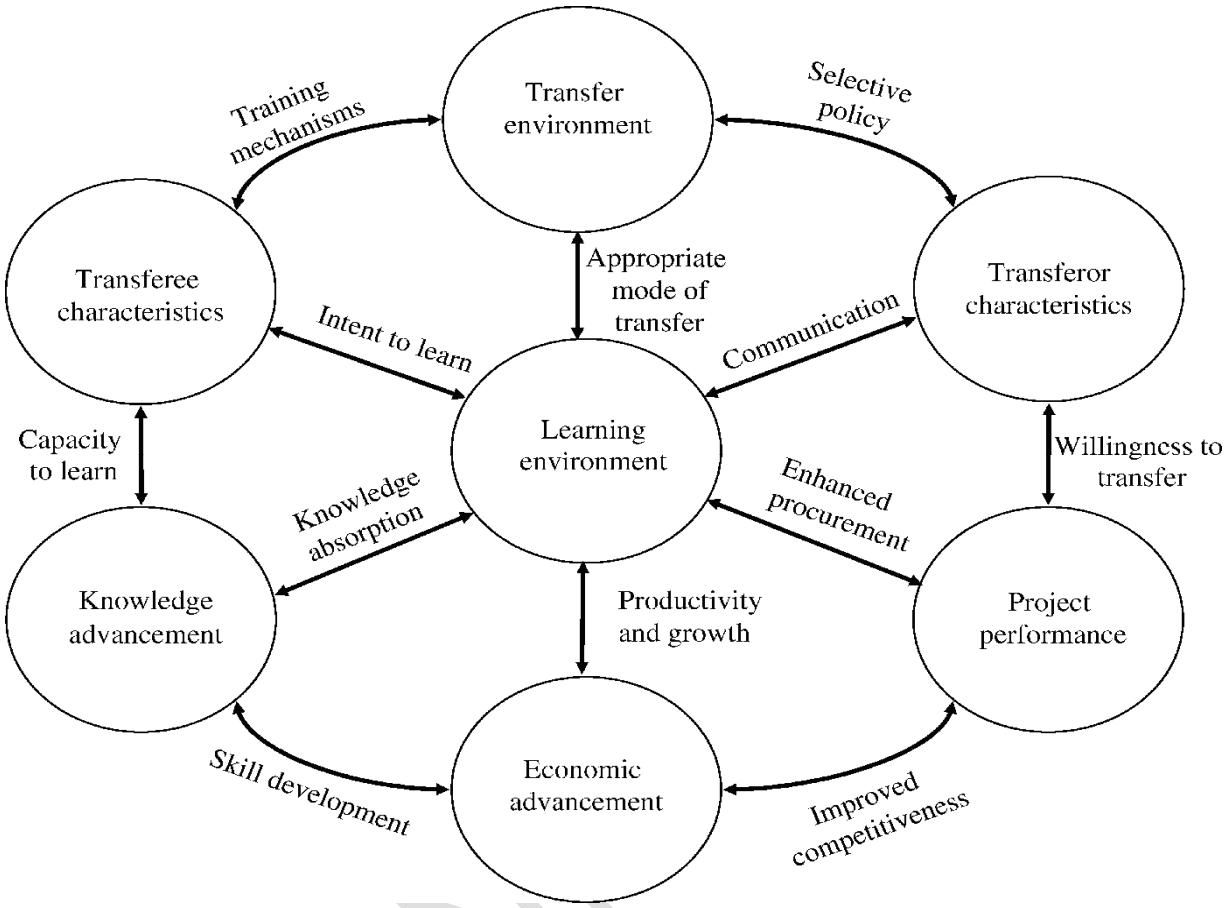


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A prerequisite for the successful knowledge and technology transfer (KTT) is the innate willingness of a company's management for improvement, growth, learning and achieving. Supportive KTT environment involves desire to learn, change, advance, and perform. Companies involved in technology transfer are actor and not reactors to the dynamic business environment. They add value to their processes and products, thus creating regional growth. Therefore, supporting and encouraging more and more companies to use KTT is a key objective to every regional innovation policy and development strategy.

Knowledge can be produced, mediated, reproduced, acquired, and transformed in and between the different forms through:

- Networks;
- Consultancy;

- Continuous professional development;
- Collaborative or contract research;
- Licensing;
- Spin-outs;
- Teaching;
- Publishing and reading of scientific media;
- Movement of people (recruitment, double positions);
- Sharing of facilities.

This understanding is in line with modern views of innovation as mostly interactive learning processes – where learning includes the generation of new knowledge as well as the integration of knowledge from external sources.

2) Factors affecting the technology transfer

Factors affecting technology transfer can be placed into categories, including characteristics of the technology, characteristics of the technology developer, characteristics of individuals using the technology, characteristics of organizations (and their members) using the technology, attitudes, research policies, and regulation and reimbursement policies.

The primary reason for understanding factors, which affect technology transfer, is to use the knowledge to improve transfer activities. However, understanding these factors and their interrelationships helps to explain why the best efforts by public and private organizations to affect technology transfer do not always work.

**Characteristics of the Technology**

The nature of the technology itself will affect the technology transfer process. These may include the stage of its development (emerging, new, existing, new applications of existing technology) and its purpose. Other characteristics include its complexity and perceived effectiveness, its initial success or failure when tested, and its potential for marketability (where an actual product is the objective).

**Characteristics of the Technology Developer**

If the new technology developer is a person, his or her characteristics may influence technology transfer. They include personality, degree of fame, access to other scientists, and ability to appreciate the importance of the discovery. Access to resources is another factor important for individual and

organizational technology developers. For organizations, particularly companies, their size may influence their ability to develop new technology. It has been found that small companies contribute most to innovation in the early stages of a technological field, but large companies dominate by the time the field matures.

**Characteristics of Individuals Using the Technology**

The effects that characteristics of individual users have on technology transfer have been widely studied. Factors influencing transfer include amount of and access to information on the technology; degree to which the individual can be described as cosmopolitan or local; amount of education; preference for the goal of quality rather than economic efficiency; and the degree of openness to trying new ideas.

**Characteristics of Organizations (and Their Members) Using the Technology**

If the technology user is an organization, its organizational structure as well as characteristics of individuals within it will affect technology transfer. Size and resource base are important variables, In general, the larger the organization and the greater its resource base, the more likely it is to adopt innovations. Yet the effects of these variables are often overridden by others—organizational complexity, centralization of decision-making, and formalization of rules and behaviour.

**Attitudes**

Attitudes is a class of factors influencing the technology transfer process at all stages. Favourable attitudes can speed up the process, while negative attitudes can slow it down. Attitudes of the individuals potentially adopting or developing a new technology will interact with the attitudes of the society around those individuals in affecting the decision to develop or adopt. A final point to be made here is that it is unlikely, if not impossible, that contribution of attitudes to technology transfer will ever be quantified. However, their importance must be recognized.

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### Research Policies

While it is true that various types of research are actually part of the technology transfer process, it is also true that several types of research policies affect the process. First, the way total research funds are distributed among the stages of the transfer process will affect the transfer, which occurs. While basic research is not actually part of technology transfer, it provides the knowledge base for technology development. Thus, the relative amount of funds devoted to basic research will affect the amount of knowledge ready to be applied, the amount of funds devoted to applied research will affect the amount of technologies to be developed and transferred, and so forth. The amount of funds available for evaluation and demonstration will not necessarily affect the amount of technologies transferred, but it will affect the amount of technologies that are transferred appropriately (i.e., those that are transferred after being shown to be efficacious, safe, cost effective, etc.). Second, the criteria used for setting research priorities, both overall for an organization and within any program for specific projects, will affect the types of technologies transferred.

### Regulation and Reimbursement Policies

Regulatory actions and more informed reimbursement decisions help to insure that emerging technologies are efficacious, have acceptable risks, and are used appropriately (e.g., are used cost effectively). Private industry determines which products and devices it will develop primarily through market-based criteria. To address perceived deficiencies of the market approach, governmental actions infuse additional criteria based on social and political concerns. These governmental actions have generally been regulatory in nature, concentrating on the costs to our health, safety, and environment. Because these costs are diffuse, they can be addressed through collective, governmental actions but not as effectively by individuals. Government's role as a purchaser of technologies has also led to a need to minimize reimbursing for the use of ineffective technologies. This role has also created a need for ways to help decide which among the array of technologies are the most appropriate. In the regulatory process, diffusion into the marketplace is unquestionably slowed, and some technologies are filtered out. Reimbursement policies can also slow (or speed up) diffusion.

Slowing the diffusion of new technologies may allow for more informed and timely decisions before widespread use.
The effect on innovation (or technology transfer) from regulatory and reimbursement policies is not simply one of whether the process is inhibited but also whether the alterations in it are unintended or undesirable. Government support of R&D has long sought to alter the process, most notably to accelerate its pace and push it in certain directions. Regulation, particularly when it alters the competitive market, can alter the direction that innovations take. Reimbursement policies probably have more effect on the pace of the process.

# B) TYPES OF KNOWLEDGE AND TECHNOLOGY TRANSFER – BENEFITS AND RISKS

## Types of Knowledge and Technology Transfer

The initial step in the transfer of technology process is the recognition of a need. This need must be satisfied by current technology applied differently, or it must be satisfied by new technology. Scientific changes can bring about new products utilising new technologies. Competition together with the market may be one of the greatest initiators of the need to transfer new technology. The market is becoming increasingly fragmented and more sophisticated. This means that an organisation's products or services must be tailored to address the specific needs of individuals. If an organisation does not have the technological capability to do so, it will loose that market to its competitors. Technology can give a business the competitive advantage it needs to secure its position in the market. Legislation may also create a need that has to be met by obtaining new technology. Human inquisitiveness together with innovation as a company policy ensures advances in technology. Innovation as a company policy may be applied in two different models: internal innovation and technology scouting through attracting innovative solutions from outside the company. More and more, big companies practice the open innovation business challenge model to source new technologies and disruptive solutions from outside the company.

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Before a technology can be identified that may satisfy a newly identified need, senior personnel (managers and above) must have accurate knowledge of not only the company's technological position but they must also have knowledge about the market and their competitors. This strategy will insure a well-organised approach in obtaining new technology.
When identifying technology it should be assessed in order to find the most suitable technology. Aspects that should be addressed in the assessment process include:

- Strategic implications;
- Effect on market and customer;
- Operational changes;
- Technological abilities of suppliers;
- Local suitability of technology;
- Personnel and training.

Before starting the transfer process an assessment criterion should be defined in order to evaluate each identified technology. The team responsible for the transfer of the technology should define aspects to be assessed, and the measurement criteria for each aspect. It is important to involve as many people as possible especially those that will work with, or will be affected by the new technology. By involving all concerned, an objectively defined opinion should be possible and the most appropriate technology can be selected. It must be stressed that the assessment criteria, consisting of objectives and specifications already defined after the identification of the need. This will aid in the transfer process, for each aspect in the transfer process will be measured or assessed according to the defined criteria.
Most technology transfer happens between companies. The technology transferred can be in the *skills, knowledge or equipment* domain.
Technology in the form of *knowledge* can be conveyed through the following mechanisms:

- In print through technical journals and scientific magazines;
- Specialized Internet websites and peer-to-peer platforms;
- Patents;
- Orally at conferences or learned societies;
- In discussions with colleagues, consultants or with acquaintances;
- Mass and internet media;

- Courses;
- Service bulletins;
- Data packs;
- Specifications.

Technology in the form of *skills* is acquired by doing something. It can be conveyed by:

- Watching someone doing something;
- Watching a video of someone doing something;
- Demonstrations at courses;
- Hands-on training or learning by doing.

Technology in the form of *equipment* is conveyed via the following mechanisms:

- Products;
- Trade magazines and conventions;
- Sales representatives, advertising and direct mail;
- Contacts in other companies and competitive intelligence;
- Technology scouting;
- Open innovation challenges.

The table below summarizes some qualitative models for technology transfer:

| **KTT Model** | **Stages** | **Lessons Learned** |
|---|---|---|
| Bar-Zakay Model, based on project management approach | **Search, Adaptation, Implementation, and Maintenance stages** with decision-making processes taking place at each of them. The decision-making processes are similar for both transferor and recipient of the transfer. At each stage there are 3 levels of decisions (go or no-go): the importance of both the transferor | • There is a need for a comprehensive examination of the entire KTT process from "search" right through to "post-implementation" activities.<br>• A process approach must be adopted in planning and implementing KTT projects<br>• It is important to have milestones and decision points so that activities can be strengthened, mistakes |

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| | and transferee acquiring skills to undertake **technological forecasting, long-range planning**, and gathering of **project-related intelligence** is emphasised. | corrected, or even the project terminated at any point in time. |
| Behrman and Wallender Model, relevant for multinational corporations | • Manufacturing proposal and planning to arrive at decisions regarding location and preparing a business case including good resource assessments.<br>• Deciding the product design technologies to be transferred.<br>• Specifying details of the plant to be designed to produce the product and other aspects related to construction and infrastructure development.<br>• Plant construction and production start-up.<br>• Adapting the process and product if needed and strengthening production systems to suit local conditions.<br>• Improving the | • There is a need for the transferee to be involved right from the beginning in the planning and implementation of a KTT project.<br>• A technology transfer project does not end with commencement of production.<br>• Unless explicit measures are in place to ensure assimilation of the transferred technology, the technology transfer cannot be said to have been successful. |

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| | product technology transferred using local skills.<br>• Providing external support to strengthen the relationship between the transferor and transferee. | |
| Dahlman and Westphal Model, based on South Korea industrial growth model | • Carry out pre-investment feasibility to gather information and carry out a techno-economic analysis to establish project viability.<br>• Carry out a preliminary identification of technologies needed, based on the feasibility study.<br>• Carry out basic engineering studies that involve the preparation of process flow diagrams, layouts, material and energy balances and other design specifications of the plant and machinery and the core technology to be transferred.<br>• Carry out a detailed | • It assumes that the transferee will have access to high-level engineering skills. This may not be true in many developing countries.<br>• It pays very little attention to negotiation and post-implementation assimilation initiatives.<br>• A KTT project is best studied using a sequential process perspective.<br>• Any KTT project should not be commenced without a careful feasibility study since such projects often require heavy resource commitments.<br>• The transferee should be involved in the planning right from the beginning.<br>• It is important for transferees to develop sound engineering and project management skills without which the KTT |

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| | engineering study that involve the preparation of a detailed civil engineering plan for the facility, including construction and installation specifications and identification of the peripheral technology needed to make the transfer effective.<br>• Carry out the selection of suppliers for equipment and subcontracting services to assemble the plant and machinery and plan for the co-ordination of the work among various parties.<br>• Prepare and execute a training and education plan, in consultation with the suppliers of technology, for the workers who would be employed in the technology transfer project.<br>• Construct the plant.<br>• Commence operations. | process cannot be managed effectively. |

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| | • Develop trouble-shooting skills and put in place arrangements to solve design and operational problems as they arise, especially during the early years of operation. | |
| Schlie, Radnor, and Wad Model | • The transferor, which is the entity selling the technology to the recipient.<br>• The transferee, which is the entity buying the technology.<br>• The technology that is being transferred.<br>• The transfer mechanism that has been chosen to transfer the chosen technology.<br>• The transferor environment which is the immediate set of conditions, in which the transferor is operating. Attributes of the transferor environment that can influence the effectiveness of the transfer process include, among others, economic | • Even if the immediate operating environments of the transferor and the transferee are favourable to the technology transfer, if the layers of the greater environment are not supportive, then cross-border and international technology transfer could be adversely affected.<br>• Factors in the greater environment such as political relationships between countries, exchange rates, investment climates, trade negotiations, balance of trade, relative technological levels, and the status of intellectual property protection regimes could have a great influence on the success of a KTT project.<br>• The choice of the technology transfer |

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| | status, business orientation (inward versus outward), stability, attitude and commitment to the transfer project, and operating policies.<br>• The transferee environment which is the immediate set of conditions under which the transferee is operating. Attributes of the transferee environment that can influence the absorptive capacity of the transferee include physical and organisational infrastructure, skills availability, attitude and commitment to the transfer project, technological status, business orientation (inward versus outward), economic status, and stability.<br>• The greater environment which is that surrounding both the transferor and the transferee. There may be layers of this | mechanism should be based on a sophisticated understanding of the other six elements. |

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| | environment that are sub-regional, regional, and global. | |
| Chantramonklasri Model | • Carrying out a pre-investment and feasibility study<br>• Developing engineering specifications and design based on the feasibility study<br>• Commence capital goods production based on the engineering specifications and designs that have been developed.<br>• Commissioning and start-u including comprehensive of the workforce<br>• Commence commercial production | It is not clear whether the required capital goods can be produced within the transferee setting unless the transfer arrangement also includes the transfer of technology needed to manufacture these. |
| Durrani et al. | • Establishing market-place requirements<br>• Identifying technology solutions<br>• Classifying the identified technology solutions<br>• Establishing sources from where the desired technology could be acquired | This model stops with the technology acquisition decision. Its major lesson is that it stresses the importance of establishing the need for a technology transfer project and the need for identifying multiple sources of technology for enabling a better choice of transferor. |

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| | • Finalising the technology-acquisition decision | |
| Bozeman, based on technology transfer from universities and government laboratories to industry | • The transfer agent (the transferor)<br>• The transfer mechanism<br>• The transfer object (the content and form of the technology being transferred)<br>• The transfer recipient (the transferee)<br>• The demand environment (market and non-market factors vis-à-vis the need for the technology) | This model stresses on the importance of establishing the need for a technology transfer project and the need for identifying multiple sources of technology for enabling a better choice of transferor. Six "out-the-door" measures are proposed. These are market impact, economic development, political benefits, opportunity costs, and development of scientific and human capital because of the transfer. The importance of impact assessment is a valuable lesson that this model imparts. |

An examination of the models of technology transfer shows that there are several valuable lessons that they convey. These are summarized below.

- It is important to expend comprehensive analytical effort in establishing the need for a technology transfer project prior to the commencement of a KTT project.
- A KTT project should not be commenced without a careful feasibility study since such projects often require heavy resource commitments.
- A process approach must be adopted in planning and implementing KTT projects and to ensure effective technology transfer there is a need to comprehensively examine the entire process from "technology search" right through to "post-implementation" activities.
- The many changes that have taken place and are taking place in the global business setting today have made it imperative for managers of

technology to gain good insights into the transferee environment, transferor environment, and the greater environment when planning and implementing a KTT project.

- Multiple sources of technology must be identified to enable a good choice of transferor.
- The transferee must be involved right from the beginning in the planning and implementation of a KTT project.
- It is important for transferees to develop sound engineering and project management skills without which the technology transfer process cannot be managed effectively.
- Partners in KTT projects need to develop skills to be able to use formal, analytical approaches that can generate needed information for better technology transfer planning.
- It is important to have milestones and decision points so that activities can be strengthened, mistakes corrected, or even the project terminated at any point in time.
- The mechanisms chosen by a transferor to transfer technology will depend on the transferor and transferee setting, the technological capability of the transferee, the relative newness of the technology, its strategic importance to the transferor firm, and the level of intellectual property protection needed.
- As a transferee firm advances technologically, it needs to choose appropriate mechanisms of transfer, depending on the stage of the life cycle of the technology and its own technological capability profile.
- A technology transfer project does not end with commencement of production. Unless explicit measures are in place to ensure assimilation of the transferred technology the technology transfer cannot be said to have been successful.
- The success of a technology transfer project would be determined by the extent to which the transferor and transferee manage the barriers that impede transfer and strengthen initiatives that facilitate it.

## KNOWLEDGE AND TECHNOLOGY TRANSFER (KTT)

### *Technology Transfer Problems Commonly Faced by SMEs*

Based on the work of Jagoda (2007) and Ramanathan (2007), problems faced by SMEs in planning and managing technology transfer may be classified into three categories namely, technology transfer process issues, corporate capability issues, and operating environment and NIS issues. The problems are summarized below.

**(a) Technology Transfer Process Issues**

Problems during the technology justification and selection stage include:

- Wrong selection of technology based on misjudgements when preparing a business case for a TT Project;
- The cost of buying, installing, operating, and maintaining the technology is too high;
- The technology selected is too complex for easy understanding and assimilation of the transferee;
- The technology needs considerable adaptation to suit local conditions;
- Obsolescence of technology while the transfer is in progress.

Problems during the planning stage are related to the following issues:

- Transferor (seller) underestimates the problems in transferring the technology to a developing country setting;
- Transferor does not fully understand transferee needs;
- Transferee managers are not involved in the planning which is carried out only by the transferor;
- Too much attention is paid to the hardware to be purchased and not enough attention is paid to skills and information acquisition;
- Overestimation of the technological capabilities of the transferee by the transferor thereby leading to unrealistic expectations on how well the transferee can meet target dates;
- Poor market demand forecasting by the transferee of the outputs to be produced by using the transferred technology;
- The objectives of the transferor and transferee are not compatible;
- Mechanisms chosen for implementing the transfer are not appropriate.

There are also problems that can be encountered during negotiations and they can be summarized as follows:

- Differences in negotiation approaches and strategies;

- Lack of trust between the transferor and transferee;
- Goal incompatibility during negotiations;
- Inability to reach agreements on pricing, product, and marketing strategies;
- Both parties try to achieve results in an unrealistically short period.

Problems during technology transfer implementation can be summarized as follows:

- Shortage of experienced technology transfer managers;
- Lack of trust in transferor developed systems by the transferee;
- Inability to achieve quality targets;
- Delay in obtaining supplementary materials, needed for quick implementation, from the local environment;
- High cost and poor quality of locally available materials needed to implement the technology transferred;
- Inadequate tracking of the technology during implementation;
- Cost overrun due to poor implementation.

**(b) Corporate Capability Issues**

Problems due to inadequate skills include:

- Inability of the transferee to attract the required skills due to financial and industrial restrictions;
- Lack of experience of the transferee's workforce and absence of required skills at the industry level;
- Lack of training of transferee personnel;
- Absence of incentive systems at the transferee firm for learning and assimilating new technologies;
- Language barriers that inhibit effective communication between transferor and transferee personnel and restrict effective transmission and assimilation of relevant information.

There are also problems due to ineffective management:

- Lack of visible and committed top management support for the project;
- Lack of top management guidance to decide the type of the technology to be acquired, remuneration, incentives associated with the transfer, and the control of the flow of information;
- Differences in working methods and practices between the transferor and transferee managers;

- Individual or organisational competition for the ownership of the technologies and the presence of the "not-invented-here" syndrome;
- Failure of top management to identify transferee and transferor personnel who would work closely form project initiation through to full implementation.

**(c) Operating Environment and National Innovation System (NIS) Issues**

These issues include the macroeconomic environment and the general business environment in which the transferor and the transferee businesses are operating. Although the problems listed below concern more or less the conditions of the transferee business environment, there could be also restrictions coming from the transferor's national system, for example legislative restrictions concerning export of technologies and know-how, including through macroeconomic measures limiting the decisions of foreign investors for developing production facilities abroad. However, the transferee's business environment issues are related to:

- Shrinking of local markets due to adverse changes in the economic levels of the country;
- Poor physical infrastructure;
- Inadequate supportive institutional infrastructure to provide support in terms of finance, information, skill development, and technology brokering;
- Inadequate mechanisms for intellectual property protection;
- Lack of local suppliers who can deliver quality supplies and lack of policies to develop such suppliers;
- High dependency on foreign suppliers and imports;
- Lack of good education and training institutions to upgrade skills;
- Ineffective legislation and incentives such as tax holidays, tariff adjustments, and industry parks to promote technology transfer;
- Bureaucratic delays at various levels of government in obtaining approvals and clearances for finalizing technology transfer agreements;
- Ineffective and sometimes excessive government intervention and regulation;
- Foreign exchange restrictions;

- Inability of new ventures to compete with former monopolies, often owned by government;
- Uncertain tax environments.

These problems continue to affect SMEs and even large firms in many developing nations. While a SME may not be able to handle problems related to the operating environment and the NIS, it should nevertheless guard against these while working with the relevant Business Associations and Chambers of Commerce to lobby governments to rectify these.

**C) LEGISLATIVE REQUIREMENTS FOR KNOWLEDGE AND TECHNOLOGY TRANSFER INCLUDING IPR**

KTT is a horizontal instrument, relevant directly to the implementation of EU, national and regional smart specialization strategies and economic development priorities. Knowledge and technology transfer can be performed and offer solutions in all sectors, including transport, environment and green business, security, risk prevention, energy efficiency and renewable resources, tourism, ICT, etc.

## *Guidelines on the application of Article 101 of the Treaty on the Functioning of the European Union to technology transfer agreements (2014/C 89/03)*

These guidelines set out the principles for the assessment of technology transfer agreements under Article 101 of the Treaty on the Functioning of the European Union ('Article 101'). According to it technology transfer agreements concern the licensing of technology rights where the licensor permits the licensee to exploit the licensed technology rights for the production of goods or services, as defined in Article 1(1)(c) of Commission Regulation (EU) No 316/2014 of 21 March 2014 on the application of Article 101(3) of the Treaty on the Functioning of the European Union to categories of technology transfer agreements. The aim of Article 101 of the Treaty as a whole is to protect competition on the market with a view to promoting consumer welfare and an efficient allocation of resources. Article 101(1) prohibits all agreements and concerted practices between undertakings and decisions by associations of undertakings which may affect trade between Member States and which have as their object or effect the

prevention, restriction or distortion of competition. As an exception to this rule Article 101(3) provides that the prohibition contained in Article 101(1) may be declared inapplicable in the case of agreements between undertakings which contribute to improving the production or distribution of products or to promoting technical or economic progress, while allowing consumers a fair share of the resulting benefits and which do not impose restrictions which are not indispensable to the attainment of these objectives and do not afford such undertakings the possibility of eliminating competition in respect of a substantial part of the products concerned.

Intellectual property laws confer exclusive rights on holders of patents, copyright, design rights, trademarks and other legally protected rights. The owner of intellectual property is entitled under intellectual property laws to prevent unauthorised use of its intellectual property and to exploit it, for example, by licensing it to third parties. Once a product incorporating an intellectual property right, with the exception of performance rights, has been put on the market inside the European Economic Area (EEA) by the holder or with its consent, the intellectual property right is exhausted in the sense that the holder can no longer use it to control the sale of the product (principle of Union exhaustion). The right holder has no right under intellectual property laws to prevent sales by licensees or buyers of such products incorporating the licensed technology. The principle of Union exhaustion is in line with the essential function of intellectual property rights, which is to grant the holder the right to exclude others from exploiting its intellectual property without its consent.

The concept of 'technology rights' covers know-how as well as patents, utility models, design rights, topographies of semiconductor products, supplementary protection certificates for medicinal products or other products for which such supplementary protection certificates may be obtained, plant breeder's certificates and software copyrights or a combination thereof as well as applications for these rights and for registration of these rights. The licensed technology rights should allow the licensee, with or without other input, to produce the contract products.

The concept of 'transfer' implies that technology must flow from one undertaking to another. Such transfers normally take the form of licensing whereby the licensor grants the licensee the right to use its technology rights against payment of royalties. Assignments where part of the risk

associated with the exploitation of the technology rights remains with the assignor are also deemed technology transfer agreements. In particular, this is the case where the sum payable in consideration of the assignment is dependent on the turnover obtained by the assignee in respect of products produced with the assigned technology, the quantity of such products produced or the number of operations carried out employing the technology.

An agreement whereby the licensor commits not to exercise its technology rights against the licensee can also be seen as a transfer of technology rights. Indeed, the essence of a pure patent licence is the right to operate inside the scope of the exclusive right of the patent. It follows that it also covers so-called non-assertion agreements and settlement agreements whereby the licensor permits the licensee to produce within the scope of the patent.

Hard-core restrictions of competition include:

- Agreements between competitors such as price restrictions between competitors, output restrictions, market and customer allocations between competitors, restrictions on the parties' abilities to carry out research and development, restrictions on the use of licensee's own technology;
- Agreements between non-competitors such as price fixing, restrictions on passive sales by the licensee.

## *IPR and KTT*

International technology transfer or diffusion refers to the process by which a firm in one country gains access to and employs technology developed in another country. Some transfers occur between willing partners in voluntary transactions, but many take place through non-market transactions or spillovers.

The impact of stronger IPR protection on technology diffusion is ambiguous in theory and depends on a country's circumstances. On the one hand, stronger IPR protection could restrict the diffusion of technology, with patents preventing others from using proprietary knowledge and the increased market power of IPR holders potentially reducing the dissemination of knowledge due to lower output and higher prices. On the

other hand, IPRs could play a positive role in knowledge diffusion, since the information avail- able in patent claims is available to other potential inventors. Moreover, strong IPR protection may encourage technology transfer through increased trade in goods and services, FDI, technology licensing and joint ventures. Despite this theoretical ambiguity, the diffusion of technology from countries at the technological frontier to other countries is considered the main potential benefit, particularly for developing countries that tend not to innovate significantly. The evidence suggests that stronger IPR protection can encourage technology transfer through a number of channels, though once again its impact has been found to depend upon other factors related to a country's imitative ability and level of development.

The relationship between licensing, technology diffusion and the strength of IPRs is likely to be even more complex than the other channels. Licences may exist within a firm, a joint venture or between unaffiliated firms. They may cover technical assistance, codified knowledge, know-how and IPRs. They may be offered for a fixed fee, a franchise fee, a royalty schedule or a share of profits, and they may offer the rights to either produce or distribute the product of the licensee for a given period within a geographical territory. The reasons that technology and product licensing should be particularly sensitive to IPR protection are evident, however. Stronger IPR protection should reduce the costs of licensing by reducing the licensor's expense of deterring defection from contracts. They should expand security over the protection of proprietary information in licensing deals. Stronger IPR protection gives the licensor greater ability to set and monitor terms under which licensees operate. A stronger IPR regime is also likely to increase the rents accruing to the licensor, since it does not need to offer the licensee a higher share of the rents to deter imitation. At the same time, stronger IPR protection provides the licensor with greater monopoly power, which can reduce innovation, which in turn may lead to reduced licensing.



## *List of applicable legislation in Bulgaria*

- Law on Protection of Competition;
- Law on Copyright and Related Rights;

- Sector-specific legislation relevant to the requirements and standards for products and manufacturing practices, depending on the economic activity of the transferor and the transferee;
- Relevant EU and bilateral national trade agreements and customs requirements must be studied in advance in case of international technology transfer, especially involving third countries, as defined by the EU legislation.

The legal framework of the protection of the industrial property rights (IPRs) in Bulgaria consists of:

- International agreements and conventions ratified and promulgated and thus in force in the Republic of Bulgaria as part of its internal legislation;
- National legal regulations in the field of the industrial property;
- EU legislation.

National Legislation includes:

- LAW on Patents and Utility Model Registration;
- LAW on Marks and Geographical Indications;
- REGULATIONS on the Drafting, Filing and Examination of Applications for the Registration of Marks and Geographical Indications;
- LAW on Industrial Designs;
- LAW on Topography of Integrated Circuits;
- LAW on the Protection of New Plant Varieties and Animal Breeds.

The most relevant in terms of technology transfer is the law on patents and utility models. It regulates that IPR are transferable unless otherwise specified. In case the technology transferred is an invention, according to the law, “the exclusive right in an invention shall comprise the right to use the invention, the right to prohibit other persons from using it without the consent of the owner of the patent and the right to dispose of the patent. The right to use an invention shall comprise the making, offering for sale, trading in the subject matter of the invention, import included, use of the subject matter of the invention, as well as application of the patented method.”

# D) MECHANISMS FOR KNOWLEDGE AND TECHNOLOGY TRANSFER

## *Technology Transfer Agreements*

The technology transfer agreement is increasingly used in technological cooperation strategies when the most innovative companies try to enter new markets. In this sense, technology transfer contracts (intellectual property rights of know-how, depending on whether the technology involved is registered or not) are expansion vehicles for companies, that do not wish to make a direct investment in the country of destination, but they do want to take advantage of having a local partner, knowledgeable about the target market and with resources and technical knowledge that complement their own.

Generally, the technology transferred consists of registered and non-registered rights. Unregistered rights constitute of what we know as know-how, which consists of a set of unregistered practical information, derived from tests and experiences, which is secret, substantial and determined. Secret because it is not publicly available or easily accessible. Substantial because it is important and useful for the manufacture of contractual products, and determined to be described exhaustively.

Under the technology transfer agreement, the owner of the technology grants exploitation rights (licence) to a third party, or cedes the ownership of the said technology (transfer). In both case, the provision of technical assistance by the licensor or transferor must be regulated to ensure the correct application of the technology licensed or transferred. It is also convenient to establish the mechanisms to determine the ownership and, where appropriate, the registration, improvements and future developments of the said technology, and in any case include confidentiality clauses (aimed at preserving the secret nature of the knowledge and prohibiting its unauthorized disclosure) and non-competition (to discourage the transferee or the licensee from using the technology provided for competitive purposes).

Fundamentally in the case of technology exploitation license, it is also necessary to know the mechanisms that allow us to protect and defend this technology in the local market, both against its recipient and against possible violations by third parties.

1) Key issues in technology transfer agreements

The technology transfer agreement is an interesting form of international expansion, but requires meticulous analysis of some essential issues:

**Take into account the selection of the type of the alliance**

- *Assignment*: transmission of proprietary technology that implies loss of ownership over it and prevents its use by the assignor;
- *License*: granting the right to use and exploit the technology. In this case, there is a greater need for control over how the technology is being used or applied by the local partner, and the provision of technical assistance.

**Analysis of the protection of the technology at its destination**

- Possibilities of technology registration;
- Defence against third parties violation.

**Contract content (assignment/license)**

- Transmission of ownership of the technology/concession of the license of use;
- Compensation/royalties;
- Territory. Exclusive regime (license);
- Technical assistance;
- Confidentiality and non-competition agreements;
- Limits to the rights granted (license): right to sub-license;
- Ownership of improvements or developments in the technology;
- Formal aspects: public document and registrations.

It is important to know the protection mechanisms in the destination country in which the local partner will apply the technology, and to include in the contract clauses with a mainly dissuasive nature to avoid as much as possible the breach of the confidentiality and non-competition parts on the part of the transferee or the licensee.

## *KTT Mechanisms*

All technology transfer models can be divided in two major categories. The first category is passive and the second is active. This classification refers to the level of activity in applying the technology in the transfer process. If the technology transfer mechanism presents the technology to the potential

user without assistance regarding its application, then the mode is called passive. In the passive mode only the knowledge part of technology is transferred, the skills surrounding the technology are not transferred. These mechanisms can include presentations in a report. If, on the other hand the provider of the technology assists with the application of the technology then the mode is called active. These mechanisms include training. The boundaries between passive and active are not that easy to define and therefore a semi-active mode is also defined.

**Passive Mode**

The most widely used mechanism in the passive mode is the instruction manual or "cookbook" approach. This is the only contact between the originator of the technology and the user. Millions of products are made and sold with transfer occurring in this form. These self-teaching manuals used in this mode all have one thing in common: they presume that the user has some level of knowledge and competence in the specific technological area. It is an important point in this mode of transfer. A mechanic can perfectly assemble a component from an instruction manual. This becomes more intricate when we think of other technologies like glassblowing, sheet metal work and woodwork. In these areas the skill that lies with the user, must be far greater. This is important to keep in mind if you want to transfer technology. The skill resting in the user of the technology must be clearly defined by the originator, because this will have a definite impact on the success of the transfer process. If you give someone who does not know how to produce a plastic-free bottle that technology, it will be of no value to the person, because it cannot be used.

**Semi-Active Mode**

In the semi-active mode, there is a third party intervention in the transfer process. This is usually in the form of a transfer agent. In the semi-active mode, the role of the transfer agent is limited to that of an adviser. Very often in the semi-active mode, the transfer agent only screens information in the relevant field of interest and passes it on to the final user. He therefore ensures the relevance of the information to the user's needs, because of his knowledge about the technology. The role of the transfer agent is therefore one of a communicator between the technology and the user. If his role is beyond this then the mode of transfer becomes active.

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The most widely used source of technical information is in the form of written technical documentation and therefore the passive mode of transfer is the most widely used. Because of this care should be taken in the writing of these documents. Very often data banks and published material are searched in order to obtain information on relevant subjects. Experience has shown that what the first would-be user wants to read is a non-technical description of the technology. Because the reader is probably trained in one or more technical disciplines, it will be easy for him to judge the relevance of the document. Due to the increasing amount of data, this becomes more relevant. This is a time consuming effort and often it is 'outsourced' to a transfer agent. He will then be responsible for identifying relevant information and transferring it to the user. The transfer agent can be in the form of one or several people working in a team, each within their own field of expertise. An additional benefit of using a transfer agent is that the user of the technology may have interpreted the problem incorrectly and this could lead them on the wrong path in the search for a solution. Here the agent can be of help, because of his knowledge of the user's needs.
The passive and semi-active modes are therefore recognised by the fact that no third party participates in the application of the technology. Only limited assistance in identifying relevant technologies is experienced in the semi-active mode.

**Active Mode**

In the active mode not only knowledge is transferred, but also the process is carried through to an actual demonstration of the technology. In this mode of transfer, not only words and pictures are transferred, but a working system is installed and demonstrated to the users thereof. The transfer process even goes further than this. The user is trained to use the technology. It is clear that the technology transfer agent plays a key role in this transfer mode. The agent does not only identify relevant technologies but also helps in identifying the most appropriate technology. He then also helps with the implementation of the new technology and the training of personnel that will be using the new resources. In order to do this successfully, the agent must have a clear understanding of what the user's needs are. He must also have a very good understanding of the technology or must be able to quickly familiarise himself with the technology. The agent must be able to interact with the non- technical and/or technical user

on the one side, and the very technical orientated developers of the technology on the other side. The agent is no longer a feeder of information as in the semi-active or passive modes. The agent has become a technologist, seeking, evaluating and implementing technology in order to satisfy a need or solve a problem.

Organisations who have problems implementing technical solutions themselves, and who are struggling to bridge the gap between technology and the ultimate application thereof benefit most from the active mode of technology transfer is most likely to be found. Organisations like small businesses that do not have their own R&D departments have to consult a third party on introducing new technology to satisfy their needs. If they do not consider themselves experts in the field of the new technology and in implementing it, they may also seek the help of an expert in the form of the transfer agent. The transfer agent will also be able to customise the technology in order to be user-friendly in the environment it is to be implemented. The transfer agent is expected to understand each aspect of the technology, while the user is only expected to understand aspects of the technology in order to use it successfully. The success of the active mode of transfer is measured by the degree the ultimate user of the technology is satisfied.

Seven minimum aspects must be present in order to assure the success of the transfer process. These are:

- Firm statement of user needs;
- Clearly stated and understood boundary of solutions;
- Firm commitment by the user to remain actively associated during and after the transfer;
- Participation of representatives of influential interested organisations;
- Market analysis;
- The manufacturer;
- The champion.

The user is responsible, together with the transfer agent, if applicable, to clearly state their need. Both must know exactly what the problem is, or a solution will not be found, or they will find a solution, but to the wrong problem. The number of solutions to a problem may vary dramatically and therefore the have to define a boundary within which the ultimate solution must fall. The constraint on the solutions may be of cost, weight, size, etc.

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The responsibility of defining the solution boundary lies with the user. This should be done as early as possible in the transfer process.
As the transfer process evolves, there is a probability that the selected technical approach may lead to a dead end or it may require a new concept. It may even lead to a completely new solution. Therefore, the user has to demonstrate a firm commitment to remain actively involved in the transfer process. There must be a certain flexibility in the thinking of not only the user, but also the transfer agent. Pursuing one solution may bring forth another solution and both parties must be aware of this. Both parties cannot allow a setback to deter them from finding a suitable solution.
The user must also ensure beforehand, that the search and implementation of the new technology is well accepted by organisations within the user's environment. These include labour unions, management associations, etc. The more actively these organisations can be involved in the transfer process, the greater the probability of success. The user must show how the implementation of the new technology will benefit all concerned. If this is not done, a group can derail a transfer project that would have brought major benefits to the user.
One of the factors that may have the most negative impact on a transfer process may be something that lies outside the process. This factor is market acceptance of the new technology. Every aspect of the transfer process may be executed to perfection to bring forth a solution, but if the market does not accept the solution, all the effort is in vein. This is the reason why a good market analysis should form part of any good transfer process. The effect of the technology on the market place therefore cannot be ignored. Another big role player in the transfer process is the manufacturer or developer of the product or solution. It is important to identify and consult him/her as early as possible in the transfer process, for they play an important role in the development of the ultimate solution. The last of the seven aspects is the champion. This is the motivator for the whole project from the user's side. This person gives direction to the project and keeps people motivated to see the project through.

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### *Internal technology review (audits)*

Internal technology reviews are a very important exercise for any organisation in order to define their technological position. A review of this kind usually covers three important aspects. These aspects are:

- Review of the company's technological position;
- Review of competitor's technological position;
- Review of supplier's technological abilities;
- Review of client's capabilities;
- Review of local suitability of technology;
- Review of state-of-the-art technology.

These three aspects translate into "what they've got, what we have, and what we could have." A review of this nature has a few benefits apart from defining an organisation's technological position. It helps to create an awareness of people concerning technology. It also keeps people informed and this may translate into better decision-making. The difference in technology used by an organisation and its competitors may translate into competitive advantage or disadvantage, as seen by the organisation. A review of this nature can therefore have a great impact on the realisation of competitive advantage and an organisation can see, because of the review, where they are, or why their competitors have the competitive advantage. Another outcome of the technology audit is the technology portfolio of a company. The portfolio is a list of technologies used by an organisation. A review also defines an 'external' portfolio. This portfolio of technologies is available to the organisation.

The review should include the technological abilities of the suppliers and an ongoing awareness of the evolution thereof. Once the user utilises a source of technology, the organisation has to monitor it as if it were inside its own company, especially if it buys products containing the key technology. The user needs also to review its client's capabilities. Their conservatism could trap the company in an old technology or their enthusiasm entice it into a new technology too soon. Their relevant capabilities should be made visible in the technology audit.

The need often arises to adapt a technology to its destination context - typical factors in this case are things like electricity supply, water and air quality, environmental regulations, employee skill profiles and culture, local

availability and cost structures for materials and components and so on. The assessment should therefore include the local suitability of technology.
Great care has to be taken when launching a review of this kind. The biggest problem is always to obtain an objective view. For this reason, special care must be taken in selecting the individuals that will participate in the audit. It should be people across the organisation and from all hierarchies, which are directly involved or affected by the technology and the change in it. A proper workshop should explain the goals of the exercise, and all participants should have a clear understanding of the process. Internal as well as external views can be obtained from suppliers and/or customers. The difficult part is obtaining information concerning technologies used by the competition.

The benefits of transferring appropriate technology can be of great value and among those are:

- Increased competitive advantage;
- Improvement in quality;
- Cost savings;
- Flexibility;
- Reduction in lead times;
- Better service to customer.

Identifying, transferring and implementing appropriate technology can be beneficial to a company in the above-mentioned areas.

## E) GUIDELINES ON STAGES OF TECHNOLOGY TRANSFER AND DOCUMENTATION

The objectives of this guideline are:

- To elucidate necessary information to transfer technology from R&D to actual manufacturing by sorting out various information obtained during R&D;
- To elucidate necessary information to transfer technology of existing products between various manufacturing places; and
- To exemplify specific procedures and points of concern for the two types of technology transfer in the above to contribute to smooth technology transfer.

## *Procedures and Documentation of Technology Transfer*

Documentation of technology transfer including appropriate procedures and technical documents is necessary to manage properly the transfer of technology according to the KTT processes.

**Organization for Technology Transfer**

One of the most significant elements for successful technology transfer is close communication between transferring and transferred parties. Therefore, organization for technology transfer should be established and composed of both party members, roles, scope of responsibilities of each party should be clarified and adequate communication, and feedback of information should be ensured.

**Research and Development Report**

To realize quality assurance at all stages from development to manufacturing, transfer of technical documents concerning product development or corresponding documents should be considered. The research and development report (development report) is a file of technical information necessary for manufacturing, and the research and development or technical department, where appropriate, is in charge of its documentation. This report is an important file to indicate rationale for the quality design of products including information such as raw materials, components, manufacturing methods, specifications and test methods. This report can be used as raw data in case of post-marketing technology transfer. The following exemplifies information to be contained in the development report:

- Historical data of product and technologies used and of the ones to be transferred;
- Raw materials and components used and to be used;
- Rationale for design of manufacturing methods;
- Rational and change histories of important processes and control parameters;
- Quality profiles of manufacturing batches;
- Specifications and test methods;
- Traceability of raw data.

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### Technology Transfer Documentation

Technology transfer documentation are generally interpreted as documents indicating contents of technology transfer for transferring and transferred parties. The raw data of the documents (such as development report) should be prepared and compiled according to purposes, and should be always readily available and traceable. For successful technology transfer, task assignments and responsibilities should be clarified, and acceptance criteria for the completion of technology transfer concerning individual technology to be transferred. In principle, it is desirable to prepare product specification with detailed information of product subject to transfer, then proceed with the technology transfer according to the technology transfer plan established based on this specification, and document the results as the technology transfer report.

*Product Specification (Product Specification File)*

The product specification is to compile information which enable the manufacture of the product, and to define specification, manufacturing and evaluation methods of the product and its quality, and the transferring party is responsible for documenting the file. For new products, the development report can be used as a part of product specification file. The product specification file should be reviewed at regular intervals, and incorporate various information obtained after the start of production of the product, and be revised as appropriate. The product specification file should contain the following:

- Information necessary for the start and continuation of product manufacturing;
- Information necessary for quality assurance of the product;
- Information necessary for assurance of operation safety;
- Information necessary for environmental impact assessment;
- Information of costs;
- Other specific information of the product

*Technology Transfer Plan*

The technology transfer plan is to describe items and contents of technology to be transferred and detailed procedures of individual transfer and transfer schedule, and establish judgment criteria for the completion of the transfer. The transferring party should prepare the plan before the

implementation of the transfer, and reach an agreement on its contents with the transferred party.

*Technology Transfer Report*

The technology transfer report is to report the completion of technology transfer after data of actions taken according to the technology plan being evaluated and the data being confirmed pursuant to the predetermined judgment criteria. Both transferring and transferred parties can document the technology transfer report; however, they should reach an agreement on its contents.

*Check and Approval by Quality Assurance Department*

It is desirable that the quality assurance department should establish confirmation process for all kinds of technology transfer documentation, and should check and approve the documentation.

**Implementation of Technology Transfer**

Avoid as much as possible the technology transfer from transferring to transferred party only by handing over the technology transfer documentation. It is recommended that both parties should cooperate to implement technology education, training and validations at facilities where the transferred technology is actually used.

**Manufacturing Related Documents Including Standards**

The transferred party should compile documents such as product standards necessary for manufacturing, various standards and validation plans/reports after the completion of technology transfer. While the transferred party is responsible for compiling these documents, the transferring party should make necessary confirmation for these documents.

**Verification of Results of Technology Transfer**

After the completion of technology transfer and before the start of manufacturing of the product, the transferring party should verify with appropriate methods such as product testing and audit that the product manufactured after the technology transfer meets the predetermined quality, and should maintain records of the results.

**Points of Concern for Post-Marketing Technology Transfer**

While there are no fundamental differences in technology transfer between new development product and marketed product, some marketed products do not have development report which can be used as raw data. In this case, a development report needs not to be newly documented;

however, it is strongly recommended that the file should be prepared including information of specified items.

### *Technology Transfer Plan Necessary Information*

The information that needs to be part of the technology transfer plan is described below. Of course, it may be subject to modifications related mainly on the type of technology that will be transferred and on the sector-specific requirements.

- Information of raw materials to be used;
- Information on products to be produced with the new technology – specifications, applicable standards, methods of testing and quality assurance, analytics of batches, storage and expiry date data;
- Information on Implementation of Technology Transfer - persons in charge of planning, checking and settlement of technology transfer; Test methods; Persons in charge of transferring and transferred parties; Training plan (including explanation of quality assurance methods and demonstration); Plan of comparative evaluation study; Handling of data (Handling method); Acceptance criteria; Storage of raw data (storage department, storage place, and duration, etc.); Person in charge of judgment in the transferring party confirming that the technology is transferred in full compliance.
- Information on manufacturing methods including information on operating conditions (control parameters and acceptable range), information on important processes and parameters (identification of processes and parameters which will affect quality), information on in-process control, information on reprocess and rework (places and methods), basic data concerning manufacture, data concerning environment and safety (environmental load and process safety);
- Information on equipment including cleaning (cleaning methods, cleaning solvents, and sampling methods) and information on facilities (selection of materials, capacity, and equipment types, and necessity of special equipment);
- Information on Environmental Management and safety including handling of hazardous raw materials, if the case, and on degradability;

- Information on Industrial Hygiene/Occupational Health, protection for operators and protection for products.

1) Points of Concern For Preparing Technology Transfer Documentation

For smooth technology transfer, transferring and transferred parties should appropriately document and record necessary information relevant to the technology transfer. In this regard, summaries are already described in the above; however, it is recommended to prepare the following documents:

- Documents to clarify applicable technologies, burden shares, responsibilities, and approval systems, etc. concerning the technology transfer (written agreements and memorandums, etc.);
- Organizations of technology transfer (at both of transferring and transferred parties);
- Development report, if applicable, in the case of transfer from an R&D institution;
- Product specifications;
- Technology Transfer Plan;
- Technology Transfer Report.

**Documents To Clarify Applicable Technologies, Burden Shares and Responsibility System, etc. Concerning Technology Transfer**

The following chart shows details of items to be described in documents clarifying applicable technologies, burden shares, responsibilities, and approval system, etc. concerning technology transfer, and points of concern for description. Any types and forms of the documents are acceptable if they include the items in the following chart, and no duplications of the items stipulated or described in detail in other technology transfer documents are required. Again, these are applicable depending on the industrial sector.

| Items | Details |
|---|---|
| Organizations | Organizational framework, organization chart, department (person) in charge, and separation between manufacturing and quality departments |
| Supervisor | Clarify supervisor of technology |

| | |
|---|---|
| | transfer (manufacturing supervisor is acceptable) and his/her responsibilities. |
| Responsibility system | Clarify organization and its responsibilities, document control system, persons in charge of manufacturing department and quality control department. |
| Structure and equipment | Maintenance, inspection and calibration of manufacturing facilities and equipment, and antipollution measurements, etc. |
| Documentation and records | Clarify all technology transfer documentations. Describe control methods of documentation and records, and storage period. |
| Manufacturing control | Standard manufacturing procedure, and manufacturing instructions and records; Industrial hygiene control methods of buildings and facilities; Industrial hygiene control methods of operators;<br>Report on manufacturing control and quality control;<br>Control methods of raw materials, intermediates, and products. |
| Quality control | Procedures in place for testing and quality control |
| Product release | Control methods of release (procedures and person in charge confirming the product final quality) |
| Validation | Organization for validation<br>Describe communication and confirmation methods, discussion, and approval, etc. concerning validations |

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| | |
|---|---|
| | Facility qualification |
| Deviations | Clarify handling of abnormalities and deviations |
| Persons in charge | Describe persons in charge at both parties |
| Changes in technology transfer documentation such as required specifications and product specifications | Describe communication and confirmation methods and necessary formats for changes. |
| Storage of technology transfer documentation such as required specifications and product specifications | Specify storage period and disposal time and method. |
| Revision history | Documents should be replaced according to revisions. |

# F) CENTRES AND INSTITUTIONS IN SUPPORT OF KNOWLEDGE AND TECHNOLOGY TRANSFER IN BULGARIA

## *Enterprise Europe Network*

Helping small and medium-sized enterprises to develop their innovative potential and to raise their awareness on Commission policies is the aim of the Enterprise Europe Network. Launched in February 2008, this new European Commission initiative offers entrepreneurs a one-stop shop where they can seek advice and benefit from a wide range of easily accessible business support services. With more than 500 contact points and almost 4,000 experienced staff in more than 50 countries, the network is the largest in the world providing expertise and services for businesses. These are available to companies of all sizes irrespective of whether they are in manufacturing or services, although they are primarily directed at SMEs, research institutes, universities, technology centres and business and innovation development agencies. The network can help clients in their search for business partners, especially in countries other than their own, arrange individual on-site visits to assess a company's needs and provide advice on a broad range of business issues. A well-proven database enables different contact points to remain constantly in touch with each other and to pool partnership offers and requests. All the organisations in the new network, with their different backgrounds in business, research and industry, have extensive experience of helping small firms.

There are 12 Enterprise Europe Network points in Bulgaria located in Sofia, Ruse, Vratsa, Dobrich, Sandanski, Plovdiv, Stara Zagora and Yambol.

*Conclusions from the experience*: The Enterprise Europe Network can be used as a platform for further development of new services and initiatives, targeting technology and knowledge transfer, as it is one of its core activities.

## *Technology Transfer Centres (TTC) at Universities and National Science Institutions*

The TTC have been established between 2005 and 2007 with EU funding at various universities and regional and national public scientific organisations and play their role. However, it should be noted that their success is fluctuating and timid or at least not properly documented and promoted. Universities in Plovdiv and Sofia, as well as the Bulgarian Academy of Science are more active than others. Technical Universities in Varna, Ruse and Gabrovo also produce talents, however they are quickly lost due to migration. The results of some of the TTC are related to promotion of some research activities and conduction of workshops with industry but real tight industrial links between the academia and the businesses are scarce and not effective.

*Conclusions from the experience:* Links between the TTC, the business supporting organisations and the SMEs are ad-hoc and should be strengthened, especially in structures outside the capital. Moreover, modern research and development infrastructure is needed in order to respond to the dynamic business environment challenges.

## *JOBS Centres*

The network of JOBS Business Centres is established, covering smaller cities where structures of that kind would have been unlikely to exist without a state policy in that field.

The services JOBS centres offer are business incubation (not all of them), small leasing loans, consultations and trainings to local SMEs. After cuttings in state funding, most JOBS centres continue still, at a very low level, to perform services in support of entrepreneurship and reduction of unemployment, such as consultations and pre-qualification training of the unemployed.

*Conclusions from the experience*: The network of business supporting units can be revitalized, if it is thoroughly linked to well-established working organisations in bigger cities. They can serve as local intermediaries of KTT centres, thus covering as well smaller cities, where establishment of new structures would be feasible in a long-term perspective only after a critical mass of innovative businesses is developed.

## *Business Incubation*

The first business incubator in Bulgaria has been established in Ruse, managed by the Business Support Centre for Small and Medium Enterprises-Ruse in 1997 as a pilot project, in conditions of hyperinflation. In spite of the hostile economic environment at that time, BSC SME has proved that the world practice of business incubation can be applied in Bulgaria. After its success the business incubation practice has been adopted as national policy by the Bulgarian Government to fight unemployment and foster entrepreneurship. BSC SME helped the establishment of incubators all over the country. BSC SME has also started and developed a second and third business incubator along with a so-called "Virtual Incubator" – the companies use the start-up credit or the machine leasing system or both without using the premises. Two of the companies from the virtual incubator are high-tech. The greater part of the tenants has never had their own business till the moment they entered into the incubators. From this point of view the Business Incubator is a great opportunity for the support of start-ups and contributes to their future development. In total 97% of the incubated business is production – high-tech, food, agriculture and industry. The remaining 3% are companies offering services.

Another Business Incubator has been established and successfully managed as well by the Regional Development Agency and Business Centre-Vidin. The services offered include space, administrative services, business information and consultations, trainings.

*Conclusions from the experience*: The "general" type of business incubation practices has already played its role in the mix of business supporting services. More targeted incubation practices are needed to develop innovative and competitive SMEs. However, based on this experience, KTT could be developed to support the necessity of specialized services fostering innovation and to take business links to a higher level.

### *Established contacts with leading KTT organisations in Germany*

A valuable cooperation has been established with one of the most experienced KTT organisations in Germany.
The Steinbeis Innovation gGmbH (SIG) is part of the Steinbeis Foundation for Economic Promotion. Steinbeis was founded in 1971 and has 30 years of experience in technology transfer. At the level of 2011, the Foundation runs more than 850 so called Transfer Centres worldwide which are mostly attached to research organisations in order to guarantee close connection between R&D and industry.

*Conclusions from the experience*: Closer links with such experienced organisations must be developed not only with Germany, but with other EU countries as well in order to parallel develop networking and international exchange.

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