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PhD Thesis

Abstract

**INVENTION PATENTS AND INNOVATION COMMERCE –
PRIMARY FORM OF INTERNATIONAL TECHNOLOGY
TRANSFER**

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INTRODUCTION

International technology transfer, based on the complexity of its processes, can be considered as an important element of international commerce with human intelligence, exponential flow of the Information Society. Rapid development and evolving complexity of information based technologies brought a reconfiguration of economic space and, also, of the socio-politic aspects of today's society, offering also the basis for a major shift in the proportions and structure of the global power.

As the global market becomes more and more competitive, the undeveloped and the developing countries find it very difficult to gate out of the vicious circle of being dependent of exporting primary goods, trying to produce and export manufactured goods, with a greater added value and a criteria for welfare. Technology is the neo-factor which can offer these nations the possibility to reduce the gap which separates them from their strong and innovative competitors, based in the developed countries of the world. In this context, technology transfer and adaptation become prime components in the tentative of these countries for economic growth and development, but, in the same time, they can become important costs in the development of an economy, at micro-level and at macro-level.

Various forms of intellectual property rights became in the last years a major part of our daily life, starting with the patents which cover the coffee we are having for breakfast, the registered design of our mobile phones, the copyrights of the books we are reading and finishing with the trademark of the restaurant in which we are having lunch. The reinforcement of the intellectual property rights was the first step. The second was commercializing them, internationally, as every common good or service of the contemporary economy.

From the different forms of commercializing intellectual property rights, international licensing impose as the most adaptable, being also transparent and efficient for the both parties involved in the arrangement. As a proof of the international success of this method of commercialization of international property rights, we have the data coming from various international organizations, which prove the extended implication of all the nations of the world in the international licensing processes, as sources or as targets for these flows. In this context, we have decided to further research this technology commercialization form and we have tried to offer to all interested parties some procedures and analysis technics of the licensing need and

decision, and, afterwards, of the licensing efficiency. We have based our research on the necessity to document in a better way this process at the level of the Romanian specialized literature and we have offered solutions of analysis and decision making specific only to top tier consultancy companies from the developed countries.

We are considering that the area of this research is a major one and will have a massive impact in the process of economic growth and economic development, at a microeconomic level, but especially at a macroeconomic level. Many of the growing economies of the world, states with medium revenues, invested in obtaining diverse licenses to sustain their productive sectors and to increase their competitiveness on the global market. There are many success examples of economies which have based their economic development of the last decades in attracting foreign technologies, many of these through international licensing agreements. In these conditions, we believe that the research theme is a modern one, which have proved its importance in the framework of contemporary economic theory and which would have a massive impact, furthermore, on the study of international economics and international business.

The central objective of this study is to identify today's characteristics of international licensing and to define a decisional framework in economic efficiency conditions for it. The working hypotheses of this research are:

- International technology transfer is an important part of today's global economy.
- International technology transferred developed and presented in the last decades, diverse forms and transfer methodologies.
- The legal framework for protecting intellectual property rights becomes more and more regulated and many of the world's countries adhere to these rules of conduct.
- International licensing is the primary form of international technology transfer, being one extremely adaptable and transparent.
- There are several indicators for measuring the economic efficiency of international licensing which can create the basis for a coherent analysis model, easy to use and generally usable for the majority of the economic organizations.

The practical analysis methods used in this research were the case study (i.e. when presenting intellectual property infringements), statistic data analysis in order to observe thresholds, variations trends, geographic directions of the economic phenomena etc. (i.e. when analyzing the new global architecture of international technology transfer or when analyzing the

quantitative, qualitative or geographic parameters of international licensing fluxes) and the unitary modeling of an economic process based on the analysis of its components (i.e. the due diligence model of international licensing or the analyzing scorecard for international licensing efficiency).

1 ECONOMIC DIMENSIONS OF INTERNATIONAL TECHNOLOGY TRANSFER

In the first chapter we have reviewed the terminology associated with this research, defining concepts as technology and technics, technology transfer, innovation, Research & Development, technical progress and also analyzing some theories and economic models focused on international technology transfer. This first chapter ends with a practical study of the quantitative, qualitative and geographic coordinates of technology flows at international level, trying to present in this way the contemporary architecture of international technology transfers.

In some diverse sources of specialized economic literature, the concept of technology is defined as:

- all instruments, tools, machinery, utensils, weapons, buildings, communication or transport means, but also the knowledge use for creating and utilizing these;
- Information needed for obtaining certain production outputs using particularized selection and mixing methods of some inputs. Technologies may be defined as: particularized processes of production, organizational structures, financing methods, marketing instruments or any combination of any of these.

Technology may be described as a concept concentrating four components:

- Goods of physical existence incorporated in other goods or services (Technoware);
- Human abilities incorporated into persons (Humanware);
- Codified elements incorporated into data structures and information (Infoware);
- Organizational processes and structures (Orgaware).

International technology concept is a concept very present in international specialized literature, many authors trying to define it or to determine the terminology of the concept. Also, the term is used by economist and other professional categories, being present in the majority of

the dictionaries and the technical-economic encyclopedias. In these, technology transferred is defined as:

- passing the property on a technology developed or generated in a location, to another, through legal means, like technology licensing, franchising or converting technological progress into commercial goods or services.
- transferring new technologies from their developer to a secondary user, especially from developed countries to developing countries, trying to encourage their economy in its growing process.

Between the authors which started studying technology as a part of economics we can consider Thorstein Veblen, which took the German concept of *Technik* and adapt it in order to create the current concept of *Technology*. We are considering “Leontief paradox” as a crucial moment in the study of technical endowment, offering the basis for several models and theories which will try to offer an answer for the unusual situation described by it. As an answer for the “Leontief paradox”, several liberal neoclassic economists drafted new theories having as the starting point the theory of the relative advantage in international commerce. These theories can be grouped into two major categories: neo-factor theories and neo-technologies theories. Beside these, we have described in our study some contemporary international technology transfer models, some analyzing it through the lenses of the Ricardian commerce model, others using foreign direct investments flows.

In the next subchapter of the first chapter we have studied the framework for creating and developing technology and the way in which technology supports the evolution of the society and the economy of a state. We’ve started by determining the terminology for innovation (as a process and as the result of this process), analyzing afterwards the impact which the activity of Research & Development has in an economy and finalizing by stating the link of these two concepts to the economic and technical progress of a nation.

Research & Development concept refers to the systematic effort used for the growing the knowledge level, including here human knowledge, culture or social knowledge and the applicability of this knowledge for developing new elements.

Research & Development activities take place in specialized units or centers which belong to companies, education institutions or governmental organizations. These activities are

considered not to have an impact right from the start on the business environment, but during the researches numerous impact studies are produced in order to forecast the economic efficiency and the direct productive results of the newly developed technologies.

Joseph Schumpeter defined technical progress as the motor of economic growth, covering all innovation activities of the productive sectors, having as a base the applicative scientific research.

Technical progress can be defined as an improvement in the way goods and services are produced, marketed and commercialized, having an important role in revenues augmentation and poverty reduction. In fact, technical progress can be considered as a key element in human progress and humanity evolution.

In the last part of this chapter we propose a quantitative and qualitative analysis of international technology transfer process, utilizing the following groups of indicators:

1. Balance of payments indicators:
 - a. Licensing prices
 - b. Licensing costs
 - c. Foreign direct investments attracted
2. Technology specific indicators:
 - a. High-tech exports
 - b. Patent applications: residents and non-residents
 - c. Trademark applications: residents and non-residents
 - d. Research & Development investments

As a conclusion of this analysis we observe an evident orientation, as in Krugman's model, of the technology flows from North to South, from the countries with high revenues to the states with medium and low revenues and attempt of the last ones to adopt and adapt technology, to use it in exporting sectors and, why not, to become from targets of international technology transfer flows, sources of technology.

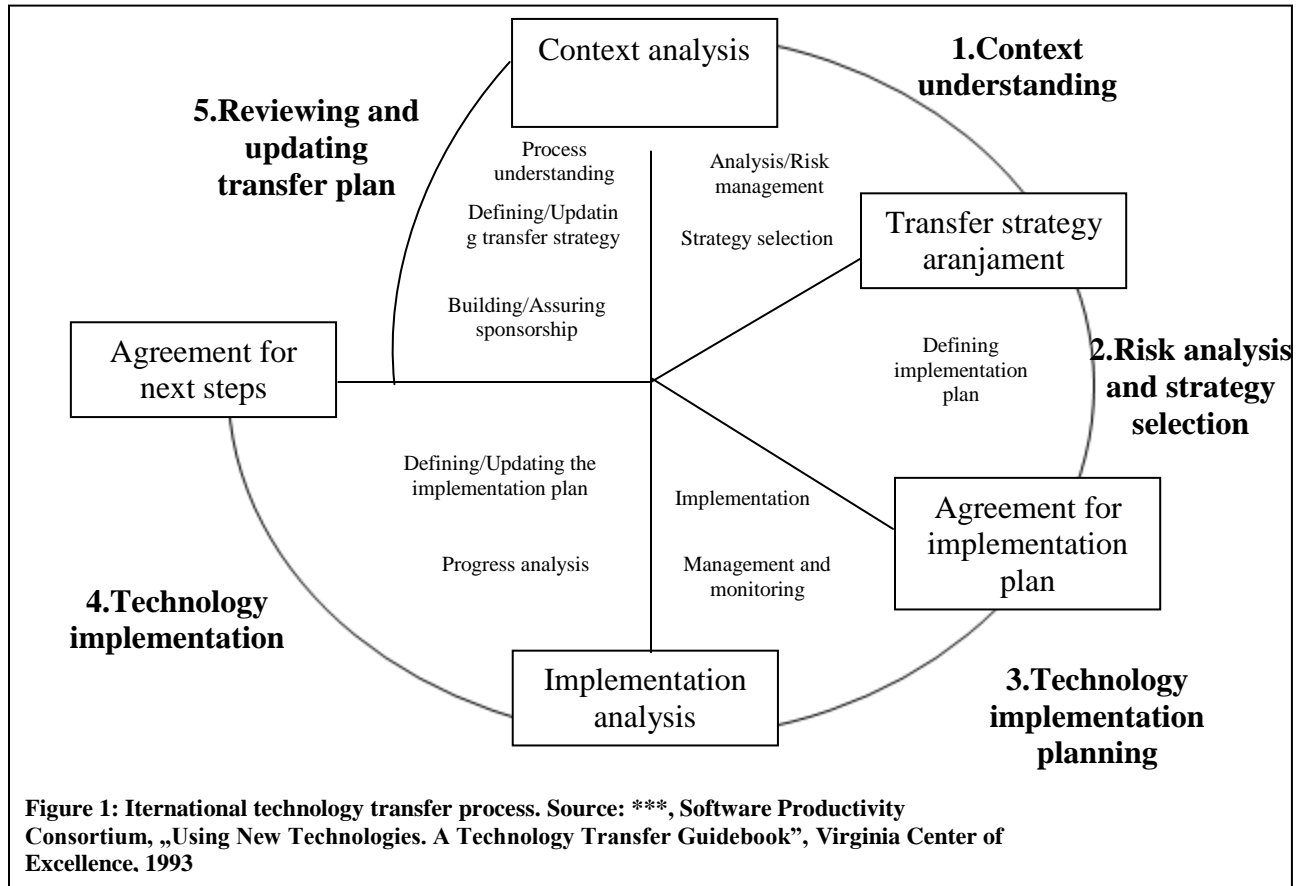
We can conclude also that the effects of the global economic crisis have influenced technology field also, where they created the basis for a new architecture of international technology transfer, an architecture in which the role of medium and low income states is more significant, and the technology gap between these and the high income countries is diminishing. Relocating high-tech production to medium income countries and maintaining the investment

process of these countries in Research & Development, presents the basis for a homogenization process of the technological development level of high income and medium income countries, and, in the same time, the basis for global economic power reorientation.

2 FORMS, EFFECTS AND RISKS ATTACHED TO INTERNATIONAL TECHNOLOGY TRANSFER

In the second chapter we have analyzed international technology transfer based on process view, describing a series of mechanisms and transfer techniques as part of this process, insisting also on some consecrated decision models for international technology transfer. We have tackled also the subject of technology spillovers, as an unavoidable component of international technology transfer process. In the second part of this chapter we have analyzed the economic effects of international technology transfer at micro, macro and international level. The final part of the chapter we have dedicated to the study of risks which may occur in technology transfer processes and the management of these risks.

International technology transfer may be analyzed as a process, in the sense of considering all its activities, in a logical chain of events, identifying the inputs and the outputs and determining the interconnections between several activities and mechanisms. The model may be represented as a spiral, in which all the phases mentioned above succeed each other, clockwise, in the sense of a continuous evolution the final success of the process.



At the current moment, at international level, there are numerous channels for transferring technology. Several authors propose three major channels for international technology transfer.

The first channel used widely is the *commerce with technology intensive goods*. Practically, these goods became technology transfer mechanisms from source countries to targeted countries, through import-export activities.

A second channel is represented by *foreign direct investments flows*. The most frequent scenario in this sense is the investment process of multinational companies in their local branches, found in countries less developed comparing to the country in which the headquarters of the company are located. Foreign direct investments flows become in this way transfer mechanisms for human knowledge and expertise, elements which are often transferred involuntary to the other companies on the local market, offering the basis for a generalized technical progress at the level of the entire economic sector.

A last transfer channel is the *technology and knowledge commerce through international licensing*. The last two channels: international licensing and foreign direct investments flows are

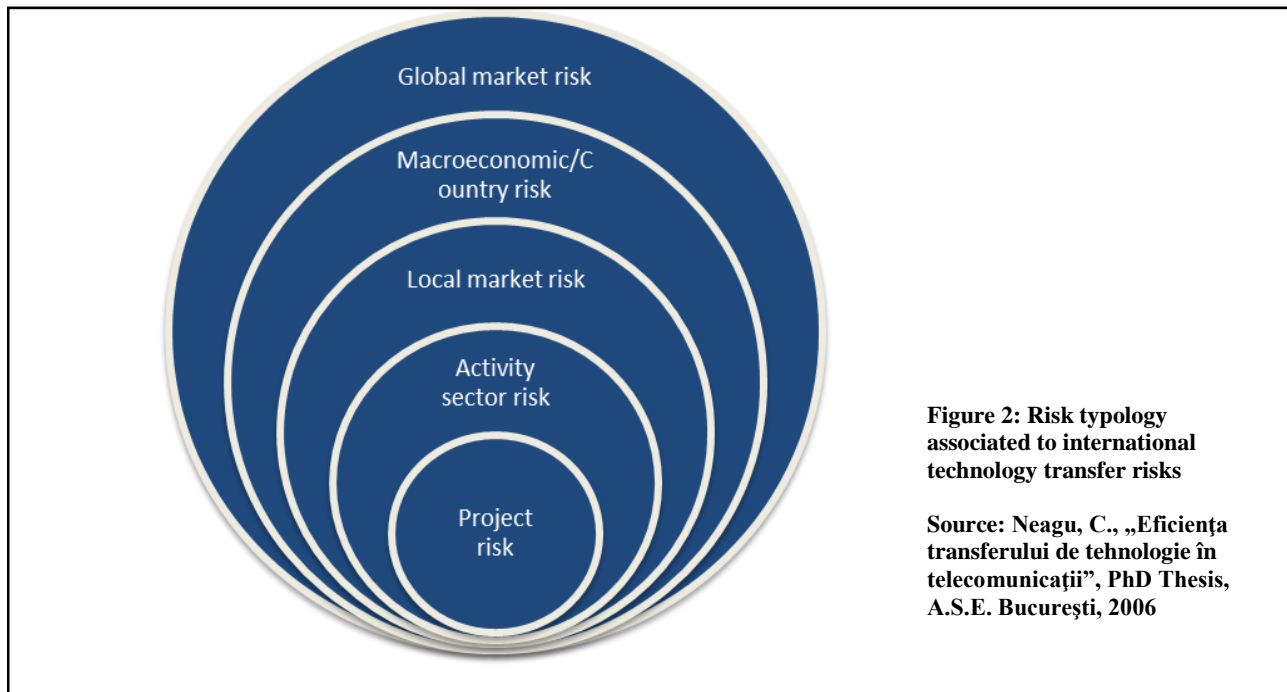
considered to be substitutable, the decision towards one of these channels taking into consideration the general strategy of the companies involved in the transfer process. Generally, an important element in taking this decision is the level of legal reinforcement of intellectual property rights in the source country, but especially in the target country of the transfer process. In this context, we can comment that patents, production secrets, copyright or trademarks represent a series of facilitating elements for international technology transfer.

Foreign companies, many of them subsidiaries of multinational corporations, are an important source of new technologies for local companies. These are the owners of intangible assets as technical knowhow, managerial and marketing competences, contacts, reputation, elements which help them a lot on some high competition markets. Though, these intangible assets, through their nature and because of being intensely used on a market, may become usable by the local companies, offering them a serious productivity boost.

This phenomenon is called *Technology Spillover*. Specialized literature proposes two main channels for technology spillover realization: horizontal technology spillovers and vertical technology spillovers. Horizontal technology spillovers take place when some branches of foreign companies enter on a specific market and through various channel like imitation, personnel recruitment etc., the local competitors adopt newly entered technologies and boost their productivity. Vertical technology spillovers take place in the framework of supplier and/or distribution agreements between local companies and foreign companies newly entered on a market. The local companies are pressed, but also helped to deliver high quality and productivity standards.

International technology transfer is a complex process, with increased dynamics and variable temporality. In this context, when analyzing its effects, we've tried to take firstly into consideration the planned effects, but we would be analyzing also the collateral effects, at micro-level (at the level of the companies involved into the transfer process) and at macro-level (at the level of host and target countries) and afterwards we would be analyzing the global effects of international technology transfer, being viewed as a source for reallocation and progress.

International technology transfer as a process can be affected by risks and uncertainty. In the case we are considering the transfer process as a project, especially if there is an investment component involved, we have to study the occurrence and the management of risks. The typology of general risks attached to a technology transfer project, can be described from particular to general, as in the following figure:



In the management of international technology transfer risks, we are starting in identifying the probable risk sources, which would be discussed with all the partners and split between host company and target company. Each party will draft for all the risks it is covering, a strategy which will contain risk cataloging and specific action plans. Next phase will be the impact analysis of potential risks and determining the probability they would appear. These two elements will represent the base for risks classification into at least four categories (inacceptable, major, medium and low). For all identified risks there will be named an owner. These risks, together with all responsibilities attached, will be recorded into a risk management plan. Last two phases will consist of formulating and applying risk diminution action plans and the monitoring of these plans.

3 INTELLECTUAL PROPERTY RIGHTS – LEGAL FRAMEWORK FOR INTERNATIONAL TECHNOLOGY TRANSFERS

The third chapter is presenting some general elements of international property rights legal framework. Thereby, we have analyzed the legal framework of international technology transfer from the perspective of supporting rights (copyright, patents, trademarks etc.), but also from the perspective of the conventions and treaties which cover these rights at international level. At the end of the chapter, as a practical study of the concepts presented, we've put together some recent case studies of intellectual rights infringement.

International property rights represent a component of the legal framework which studies the aspects related to the creative effort or to commercial reputation and clientele. The study area of intellectual property rights is extremely large, from literary and artistic works, movies, software, to design, inventions, trademarks and commercialization and distribution frameworks for various goods and services. Intellectual property rights cover generally the protection, exploitation regulations, copying limitation and abusive use of another party's work or reputation, stating in the case of this kind of illicit actions, the measures and compensations which can be imposed. There are several legal elements, from various legal areas, which together form intellectual property rights legal framework and we can name a few: copyright, rights from organizing events, secrecy laws in various fields, patents, registered design, unregistered design, trademarks, transfer rights or trade libel.

In the second part of this chapter we have analyzed the international legislation which covers intellectual property, presenting in detail some conventions as those from Paris, Bern or Stockholm. Paris Convention also known as the Convention for industrial property protection represents the first initiative at international level in field of patenting, industrial design, trademarks and connected rights, being signed by 11 founding states, following that in the contemporary era to adhere to it the majority of world's states. Bern Convention, also known as the Convention for literary and artistic works protection, was the first international measure to protect copyrights. Stockholm Convention is known for establishing the World Intellectual Property Organization (WIPO), which has replaced the two international bureaus which emerged after Paris and Bern Conventions.

In the end of the chapter we've presented some notable case studies of intellectual property rights infringement: infringement of copyrights (RIAA vs. Napster, Xerox Corporation vs. Apple Computer, Inc. and Apple Computer, Inc. vs. Microsoft Corporation, Princeton University Press vs. Michigan Document Services, Inc.), patent infringement (Acacia Research Corporation vs. Yahoo!, SP Technologies / EMG Technology / Softview / St. Clair Intellectual Property Consultants / HTC / Nokia vs. Apple), trademarks infringement (Starbucks in Eastern and South-Eastern Asia), industrial design infringement (Honda in Malaysia).

The cumulative conclusions of these case studies are that intellectual property rights protection is becoming more and more visible worldwide, in all domains, but the fine line between the legal and the illicit actions is becoming thinner. Because of this, it is imperative when starting any economic activity, any entrepreneur to determine the risks attached to intellectual property rights and the economic and legal costs of these risks.

4 INTERNATIONAL LICENSING – PRIMARY FORM FOR TRANSFERRING INTELLECTUAL PROPERTY RIGHTS

The fourth chapter analyzes international licensing as a primary form of international technology transfer. The first part of the chapter is presenting the legal framework of international licensing, from the perspective of the international organizations and describing the content of standard licensing contract, and the second part is referring to the economic aspects of international licensing, analyzing its micro and macro level effects and studying its qualitative, quantitative and geographic orientation dimensions at international level. This part is to deliver a dynamic overview of international licensing worldwide and to determine its importance in the economic evolution of medium and low income states.

From the legal point of view, international licensing includes a group of contractual arrangements, in which a company from one country (the licensor) transfers intangible assets (patents, commercial secrets, know-how, trademarks and names) to a foreign company (the licensee) for some royalty or other forms of payment. Usually, this transfer is accompanied by technical assistance for assuring proper exploitation of the sold assets.

From the perspective of the WIPO, when taking into discussion a patent, beside the exploitation of a patent by its owner, there are other means of exploitation: selling or licensing the patent. Selling a patent is an option only if the owner doesn't want doesn't have the capacity to draft a feasibility study of the patented idea, from a market perspective (test marketing). In the case that the idea has a practical and a commercial proved applicability, in most of the cases, the owner will license the patent, trying to link his revenues coming from the license to the commercial success of his idea, exploited by another company. In this case, the owner will offer a voluntary license (we are using this term in order to differentiate it in comparison to non-voluntary or compulsory licenses, which we are considering in a separate subchapter), with limited rights (to a geographic area, to a market, to a period of time) or unlimited rights.

TRIPS Agreement, even if it is not determining the legal framework of international licensing, it has a certain importance because in chapter 5, article 31, offers the adhering states the right to grant compulsory or non-voluntary licenses for some patents (even if the owner of the patent is disapproving this action).

Between the economic advantages of international licensing, in comparison with other international business models, we can mention:

- The avoidance of customs barriers and taxes, when exporting some goods in specific regions or countries. In this case there can be avoided tariff limitations (high taxes on some categories of goods) and non-tariff restrictions (i.e. quantitative limitations). International licensing can become the sole scenario of internationalization of a business towards states with high commercial barriers. Though, the issue presented above remains if the licensing process imposes parallel flows of inputs, equipment etc.
- Political and administrative risks efficient management in the case of the targeted country, especially expropriation risk, a major risk in some states even today in the context in which there is a strategy to enter on a market with FDI flows.
- Licensing can be considered as the sole viable scenario of penetrating strategic market sectors of some states (weapons, telecommunications, railways etc.).
- Licensing means not assuming the costs of organizing locally a business, adapting the products to the local needs or legal, social or cultural differences.

There are, though, several disadvantages of international licensing, which might exclude it from the strategic portfolio of some companies:

- The need to be the owner of attractive intellectual property rights for the foreign markets partners, rights obtained after huge investments in Research & Development, Market studies etc.
- Activities control, if not stated otherwise in the contract, is minimal, which might produce improper qualitative levels and a bad name on the market. This issue might be tackled using control clauses in the contract and maintaining a good communication between parties.
- Revenues relatively small comparing to those obtained after direct investments. Even in the positive case of correlating the license royalties to the revenues generated by the licensee, the percent will be reduced (worldwide average is around 5%). This situation can be improved imposing some connected acquisitions: technical assistance, maintenance services, raw materials, equipment, spare parts or consumables.
- The risk of creating a strong competitor on a certain market, after the execution of the licensing contract or, sometimes, even during one. This risk can be minimized using territory limitations, license limited duration and production stopping when the license expires. One has to have in mind the fact that if the contract will be infringed by the partner, this might take to a long trial with unexpected results (especially if the trial law will be the one of the licensee's country) and with huge human and material efforts.
- Even if the licensee will keep the secrecy of the received information, technology spillovers to competitors are very hard to counteract.
- An exclusive license is usually very disadvantageous for the licensor, making him dependent on the beneficiary of the license and stopping him from putting into practice other internationalization or market penetration strategies. This issue can be diminished when acquiring part of the stock of the licensee's company or using joint-venture companies.

In the end of the chapter we have drafted a quantitative and qualitative analysis of international licensing flows, trying, also, to determine the geographic orientation of these flows.

As a conclusion of this study, we can observe the attempt of the less developed countries, with smaller incomes, to develop specific economic sectors by importing licenses from developed states and the polarization of the revenues coming from international licensing to a small group of nations.

World economic crisis influences, in a great part, the results of this study, describing a different evolution for high income states comparing to medium income states. If in the case of high income states we can clearly observe a reduction of the revenues coming from international licenses and also a regression of the expenses for international licenses, when analyzing medium income states (especially BRIC states), the regression is far less evident, describing a capping of these revenues and expenses. When analyzing net revenues coming from international licensing, the difference is more visible: if the major part of high income states is recording negative growth trends of their net revenues coming from international licensing starting with the first years of the financial crisis, medium income states record positive growth trends of these indicators. This phenomenon is due to the fact high income states reduced their Research & Development expenses and relocated some activities (even R&D) to medium income states, encouraging in this way technology development and adoption in these and, afterwards, international exploitation of these technologies sources from medium income countries.

5 INTERNATIONAL LICENSING DECISION – A DUE DILIGENCE APPROACH

In the fifth chapter we are proposing a support model for the international licensing decision, from the perspective of a due diligence process. In this way, we are trying to respond to the fundamental questions of the international licensing, referring to the parties involved in the process, to the rights which are licensed, to the motivations and the objectives of the parties, to the duration of the agreement to the mode of exploitation of the license and the spatial or modal limits of this exploitation and, finally, to the costs of the license. In the end of this chapter, we've created a synthetic due diligence checklist which any economic organization taking part of a licensing agreement should have in mind.

The term due diligence is used in the vocabulary of economists and/or legal advisors for defining an investigative action on the main characteristics of a person or of a business, before signing a contract or any other inquiry realized before taking a decision in conditions of caution and objectivity. This process may take the form of a legal obligation, but in the most of cases refers to the investigations realized voluntarily by the parties.

During this chapter we will try to use due diligence techniques for evaluating the main elements of an international licensing process (seen from the perspective of both parties: the licensor and the licensee) and in order to offer responses to some key questions, responses which will become the decisional support in the licensing process.

We are suggesting to the organization involved in a due diligence process that, before entering in an agreement, to participate to a complete due diligence process, the results of this process being the answers to the main questions of international licensing:

- **Who, whose is licensing?** Licensing is made by the owner of the intellectual property rights or is a sub-licensing agreement? The licensee will be the sole exploiter of the license? Is this a case of a license towards a consortium? Is the license exclusive? The licensee may or may not sub-license or transfer the contract rights and/or obligations to another party?

- **What is being licensed?** Which is the nature of intellectual property rights being licensed? Which are the connected rights being transferred? Who is it covered the situation of further developments of the technology? Who is it covered the situation of the technology being upgraded by the licensee? Is there a cross-license?

- **Why is it licensed?** Licensing is a business case or an isolated case? Licensing implies a cooperation agreement, also? Licensing is targeting entrance on a new market or the efficiency of sales and marketing processes? Is it targeting the efficient use of the assets owned by a company?

- **When and for how long is it licensed?** What is the remaining duration of the legal protection for the intellectual property right being licensed? In which cases the agreement would be terminated? In which cases the exclusivity would be terminated? Which are the financial targets attached? What rights and obligations live after contract termination?

- **Where is the license applicable?** On which geographic area might the license be used? Are there any limitations to a market sector or a segment? Is the intellectual property right being

licensed covered by the legislation of that state or country? Are there other politic or commercial implications (taxes, limitations etc.)?

- **How the license would be used?** Rights and obligations transferred to the licensee? What is the nature of the connected actions (raw materials import, final products export, assistance contracts etc.)? How are non-competition, technology upgrades and sub-licensing rights covered? What obligations would have the licensee for applying and protecting the intellectual property rights being licensed and who will bear the costs?

- **Which is the cost/price of the license?** Initial expenses at the moment of the licensing? Connected expenses? Mode of calculating royalty rights (total production, revenues, gross profit, and net profit)? Which are the financial perspectives of the sector, of the market segments being targeted by the partners? Which are the exchange rates trends?

6 INTERNATIONAL LICENSING EFFICIENCY

The last chapter of this research investigates the economic efficiency of international licensing. Based on some terminology determinations regarding the concept of economic efficiency, evaluation techniques and based on the analysis of some efficiency indicators for international licensing, we are proposing a group of indicators in order to determinate economic efficiency of international licensing, no matter the nature of the organization involved. This group of indicators is analyzed with the help of a scorecard and. For comparative analysis regarding the targeted values or the results obtained by the competitors, we would be using radar diagrams.

In this chapter, we have developed, starting with the analysis of specific international licensing efficiency indicators for various types of organization, a limited set of indicators, grouped in categories, which may be used as a generalized measuring instrument of licensing efficiency, no matter what the type of the economic organization analyzed. The most important challenges in this process were:

- Different types of economic organizations, institutional or corporative and strategic objectives differences among these when analyzing international licensing;

- The need for standardized, normalized and comparable indicators for all categories of economic organizations, even if these are coming from different economic sectors;
- The possibility of collecting objective data, using standardized processes, for calculating these indicators.

In this context, for analyzing licensing process' efficiency related to an economic organization, we are suggesting five categories of indicators, which will be describing, separately, a component of the global performance of this process. Thus, we will be focusing on the following categories of performance indicators:

1. Innovation efficiency;
2. Patenting activities efficiency;
3. Financial efficiency;
4. Colaborative efficiency;
5. Promotion efficiency.

So, the scorecard obtained when analyzing these categories of indicators, will be having the following format:

No...	Indicator	Result analyzed period	Target result for period	Comparing to target	Result previous period	Evolution trend	Weight	Score
Category 1: Innovation efficiency							15%	12,57%
1.1	Inventions no.	8	10	Bad	6	Good	7%	5,60%
1.2	Articles no.	15	20	Bad	15	Equal	2%	1,50%
1.3	R&D effort*	285	250	Bad	220	Bad	3%	2,83%
1.4	R&D duration (man-days)*	125	110	Bad	150	Good	3%	2,64%
Category 2: Patenting activities efficiency							20%	23,36%
2.1	Patents applications no.	20	15	Good	15	Good	4%	5,33%
2.2	Patents obtained no.	19	10	Good	14	Good	4%	7,60%

2.3	Patent rejected no.*	1	1	Equal	1	Equal	4%	4,00%
2.4	Legal expenses (10 thousands EUR)*	20	15	Bad	10	Bad	3%	2,25%
2.5	Application expenses (10 thousands EUR)*	17	10	Bad	5	Bad	2%	1,18%
2.6	Maintenance expenses ((10 thousands EUR)*	25	25	Equal	20	Bad	3%	3,00%
Category 3: Financial efficiency							40%	46,14%
3.1	Licenses granted	82	75	Good	70	Good	3%	3,28%
3.2	Active licenses	67	70	Bad	70	Bad	3%	2,87%
3.3	Renewed licenses	26	30	Bad	15	Good	3%	2,60%
3.4	Terminated licenses*	12	15	Good	15	Good	3%	3,75%
3.5	Total royalties (mil. EUR)	120	110	Good	90	Good	10%	10,91%
3.6	Average royalties (100 thousands EUR)	6	5	Good	4,5	Good	8%	9,60%
3.7	Sold production (mil. pieces)	245	200	Good	175	Good	5%	6,13%
3.8	New products	15	15	Equal	12	Good	3%	3,00%

3.9	New companies	4	2	Good	2	Good	2%	4,00%
Category 4: Collaborative efficiency							15%	19,26%
4.1	NDA's signed	77	50	Good	42	Good	1%	1,54%
4.2	Collaboration agreements	22	20	Good	15	Good	2%	2,20%
4.3	Active collaboration agreements	25	20	Good	17	Good	2%	2,50%
4.4	Average duration (years)	2,3	2	Good	1,9	Good	2%	2,30%
4.5	New technologies	8	5	Good	2	Good	4%	6,40%
4.6	Revenues (mil. EUR)	54	50	Good	39	Good	4%	4,32%
Category 5: Promotion efficiency							10%	10,05%
5.1	Press releases	87	100	Bad	80	Good	2%	1,74%
5.2	Events	55	50	Good	38	Good	2%	2,20%
5.3	External presentations	134	150	Bad	134	Equal	2%	1,79%
5.4	Internal presentations	26	35	Bad	22	Good	2%	1,49%
5.5	Site hits (100 thousands)	567	400	Good	258	Good	2%	2,84%
Grand total							100%	111,37%

Referring to the calculus techniques and the results interpretation, we want to make the following statements:

- Indicators not followed by the sign “*” represent maximizing criteria and the calculus mode for these will be: **Result analyzed period / Target result for period * Weight**
- Indicators followed by the sign “*” represent minimizing criteria and the calculus mode for these will be: **Target result for period / Result analyzed period * Weight**

- The score of each indicator will increase the grand total with a value:
 - smaller than the weight in the scenario of an unfavorable situation;
 - equal to the weight in the scenario of an constant situation<
 - larger than the weight in the scenario of an favorable situation;
- The final result:
 - If it would be less than 100% will describe a situation of reduced efficiency of the international licensing process, comparing to the targets;
 - If it would be larger than 100% will describe a situation of increased efficiency of the international licensing process, comparing to the targets;
- For a better analysis of the result obtained with the help of this scorecard, we are proposing mapping this result onto some performance intervals:
 - Final result $\in [0\% ; 50\%)$ – very poor efficiency of the international licensing process in relation with the targeted objectives;
 - Final result $\in [50\% ; 75\%)$ – poor efficiency of the international licensing process in relation with the targeted objectives;
 - Final result $\in [75\% ; 100\%)$ – unsatisfactory efficiency of the international licensing process in relation with the targeted objectives;
 - Final result = 100% – efficiency of the international licensing process in concordance with the targeted objectives;
 - Final result $\in [100\% ; 150\%)$ – satisfactory efficiency of the international licensing process in relation with the targeted objectives;
 - Final result $\in [150\% ; 175\%)$ – good efficiency of the international licensing process in relation with the targeted objectives;
 - Final result $\in [175\% ; 200\%)$ – very good efficiency of the international licensing process in relation with the targeted objectives;
 - Final result $> 200\%$ – excellent efficiency of the international licensing process in relation with the targeted objectives.
- We have to underline the fact that this scorecard will calculate an aggregated result in relationship to company's objectives, detailed for a determined period of time. In the case the final result will be situated on the margins of the performance interval (very poor, poor, good, very good, excellent) and if there weren't any extraordinary events and

situations (positive or negative), then this objective should be reanalyzed and the targets for the indicators to be reviewed in order to see if they aren't too optimistic/pessimistic.

- If we would like to analyze the dynamics of international licensing in relationship to a company, based on the same principles we can calculate an aggregated result which will describe the evolution in comparison with the previous period.

In the end of this chapter we are proposing a comparative analysis method for the results of these categories of indicators in relationship to the results recorded by the competition. In this sense, we will be using a radar diagram for every indicators category.

CONCLUSIONS

This PhD thesis is the result of the analysis, synthesis and systematization work of the specialized literature, Romanian and foreign, and a contribution to substantiating the international licensing decision and the analysis of the efficiency of international licensing. From a theoretic perspective, the analysis of the specialized literature, American, Asian and West-European can be considered as an infusion of recent information, which might become the base for further researches, articles and other works, of the authors, but also of others. From a practical perspective, the last two chapters of this research try to approach from a multidisciplinary view the international license process and to offer a guide of taking the licensing decision, viewed from the licensor's point of view, but also from the licensee's point of view and afterwards, after the decision has been taken, a new model, complex, but also easy to use, for measuring the efficiency parameters of international licensing. When elaborating this practical part of the study, we based our research on the knowledge accumulated during our multiple learning stages in the field of international business and in the field of general management of a company, but also on the expertise accumulated in business environment, in areas like international business, operational management, business development management, business law or international property rights.

As personal opinions which we are underlining when reviewing the terminology presented in the first chapters, we are considering that these might have as a direct result the dissemination of this information in the business environment, offering to Romanian managers a starting point in their challenge of adapting to the global business dimensions. We are

considering that this study will be offering adequate information in validating some international business strategies for a various range of economic actors.

At macroeconomic level, the attention which international technology transfer receives from central and local governmental authorities is increasing and there are pleasure groups which are promoting the facilitation and the optimization of technology flows. In this sense, we can consider as a conclusion of this research the great importance of international technology transfers as economic growth factors and as part of the solutions for tackling the current economic crisis.

Together with the encouragement of technology transfer and adaptation strategies, we are considering that there should be at micro-level, but also at macro-level a strategic orientation of investments flows towards Research & Development, which might become a solid base for the further development of that company or that country. These activities, corroborated with an increase of the level of liberalization of technology based international commerce, could become important factors in eliminating regional disparities and assuring economic and social progress. Though, for the efficiency of these activities, there have to be eliminated several wrong conducts and mentalities, like considering an Research & Development department as a pure cost center or considering international technology transfer as a way of only limiting cost through relocation. Additionally, international technology transfer, even if it is considered to be a technical concept, abstract, it has to be seen as human relationships process. The importance of the human resource in technology transfer processes is extremely high and the success of these processes is often determined by individuals' capacity to relate and to team work for obtaining mutual benefits.

Also as a conclusion of the first part of the thesis, we can observe the increasing interest of well-known economists of the contemporary period and we consider international technology transfer as an antidote for a series of major socio-economic problems of the global economy in third millennia: poverty, regional disparities, economic stagnation or from other areas of science: pollution, limitations of health and education systems etc.

The results of our study are affected, as any component of the economic life, by the current economic crisis. This offered the basis for a rearrangement of international technology flows, in which medium income states (states with expanding economies) become more and more important. The economic crisis produced a relocation avalanche of the production units towards medium income states, externalizations of Research & Development activities to partner

companies from medium income states, but also a reducing or even a termination strategy for investments in new technologies, in high income states. The economic crisis brought also many infringements of intellectual property rights, a severe increase of piracy and of counterfeited goods commercialization, especially in medium and low income countries. Practically, we can underline the fact that the effects of the economic crisis will produce a reduction of the technology gaps between high and medium income states, but also, will challenge hardly the international legal framework for protecting intellectual property rights.

As a personal note, we are considering this study to demonstrate the positive impact of the effort/effect optimum which characterizes an international technology transfer process and in these conditions the decision makers at state level should accelerate the development process of the institutional framework and of the infrastructure needed for technology development, transfer and adoption. Also, in this sense, we are considering as very commendable the efforts of international organizations which are promoting and offering active support in international technology transfer projects.

Also, as a personal opinion, regarding the last part of the thesis, we are observing a lack of specialized literature and also of professional expertise on the Romanian market regarding licensing decision analysis and licensing efficiency assessment. In these conditions, we are considering that this thesis will have a great added value from the point of view of those who want to deepen the subject, but also from the point of view of the business consultants which will be confronted with a demand of services in this field. So, we will encourage the utilization of these models in practice, in the network of business partners and collaborators we are having at this moment and we will be obtaining precious feedback referring to the applicability of these models.

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