Greek Patent Protection System and the impacts of Information Technology Industry

Emmanouil Alexander Zografakis, EZ
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Emmanouil Alexander Zografakis
Master of Science in Engineering
Seoul National University
To my dear wife Anthoula and my Kids Fotini,
Athanasia, Alexander
and also
to my brothers Stavros and George who passed away very early
ABSTRACT

Our era can be characterized as the era of knowledge proliferation and bountifulness. That has marked our era as the era following the pace of the Information Society Development. Information Society has also brought about a remarkable IT development pace over countries. Thereby, it is greatly important all that raw knowledge to become mind figments, ideas and even inventions and innovations. It is also essential to highlight that such a beneficial process will ensure the continuity of the IT development. The only way to achieve that goal is to find a way to secure all that aforementioned knowledge which is in essence an intellectual property. That has made countries to set up a patent system with appropriate legislative and regulative system. That paper sheds light upon the European patent system in comparison with the patent system of Greece and provides a proposal for ameliorating the Greek patent system taking into account some useful economical indicators.
**Key words:** EU Entrepreneurship, Greek Entrepreneurship, Licensing Acquisition, Law of Intellectual Property, theory of incentives in Procurement and Research, European Patent, Industrial Property Organization, WIPO, optimal patent length, Licensing Contract, Patent on ICT, R&D and Technology transfer,

Student Number: 2010-22836

Technology Management Economics and Policy Program

College of Engineering

Seoul National University
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Chapter 1 Introduction

An invention can be characterized as a more effective composition, device, or process. A pre-existing model or a brain figment can lead to an invention. Each brain figment can be deemed as an invention only its application can bring about an important breakthrough. In the same respect, discoveries, scientific theories or mathematical methods are not classified as inventions. The same holds true for aesthetic creations and any presentation of an item of information. An invention can be viewed as new (reaching innovation) only if it does not form part of the state of the art meaning that its outcome has not been propagated to the public. It is essential to note that some inventions can have an affinity to industry sector and such invention. Today’s debate on the competitiveness of national economies and the sustainability of national production systems under the conditions of European integration and globalization, revolves around the role of new competitive advantages associated with technological knowledge. The comparative advantages of low production costs and expertise far determined the position of countries in the global economy, rapidly displaced from the advantages of expertise and innovativeness. Thus, the contemporary issues of competitiveness and development fall within the new "knowledge economy", where knowledge is identical to production expertise. The findings are based on our analysis of the primary empirical data research study on the technological and competitive ability of small businesses. **The following section summarizes the theoretical framework of modern competitive relationship with the knowledge and innovation**. The next section focuses on the determinants of technological absorption and innovation, and the patent protection system in Information technology Industrial. Here the correlation factors with structural-functional-sectoral and institutional characteristics of the business environment to evaluate the contribution of the respective conditions in the technological and economic performance. **Finally, in light of the conclusions**
of the analysis highlights the need to adopt institutional and structural reforms for competitive growth advantages of knowledge and innovation by firms and national-regional innovation systems.

The proliferation of inventions and the propagation of mind figments and ideas to the public, with extraordinary and astonishing outcomes, have shed light on another term similar to invention that is called innovation or novelty. Innovation should be referred to anything “novel” that brings about radical changes or improvements to a situation or state. Invention is a more generic term but innovation is a stronger term that is more robust and focuses further attention on the remarkable outcome. Innovations can lead to another era in the IT world. **Innovations can pave the way for implementing inventions that can be a panacea to many areas.** Patent is the only means for inventors to secure their innovations similarly, patent is the stirring implement for prosperous inventors to come up with innovations. Innovation correspondingly deems the mind figment or the idea as the primitive and raw element in the process of IT development. The mind figment can be well processed and implemented and can lead to an invention that under specific circumstances, can lead to innovation. However, as previously mentioned, inventions and even innovations can be achieved under a legislative context that allows for the decrease of renewal fees, greater funding for innovations and, in general, proper funding for experimental purposes and even loans for the implementation of new ideas.

Intellectual property refers to the mind figments with “no physical” property elements. In essence, such figments are ideas with incorporated knowledge. As with any property that knowledge should be secured in a way that anyone from using that knowledge for commercial purposes without the endorsement and approval of the owner of the idea.
That also ensures the pioneering process of the knowledge propagation to the public by the owner of the idea.

Some organizations or institutions that contribute to the secure propagation of knowledge are:

1. World Intellectual Property Organization (WIPO)
2. World Trade Organization (WTO)
3. European Patent Office (EPO)

Table: Protection of intellectual property

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Clarifies the levels of intellectual property protection analogically to its kind, intellectual property can be divided into three categories based on the aim or focus the innovations. The most common one is industrial innovation. Which refers to distinguishing marks and aesthetic creations? Typical examples of this type of innovation are trademarks, industrial design geographical designations.
and patents. The second type is what we call spiritual property, which can be seen in literature, cultural projects and software to protect the original thinking of the owner. Spiritual property is protected by law through copyright and related rights, as illustrated table (1)

The legal aspect of an invention is cardinal in the legislative sector known as “patent law”. Thereby, it is important to scrutinize the term invention analogically to the term patent. The term patent refers to the set of exclusive rights that is granted to inventors by a State. Each country has set up a specific legislative and regulative system concerning patents. That system includes requirements, national laws and international treaties. In some cases, the term patent can move forward to include the parallel term intellectual property rights. The role of a patent is remarkable since it facilitates the bountifulness of the technological evolution. Such a system is not only national but also global. Therefore, the appropriateness of a patent system is a key to success in the section of Information Society and the parallel sector of IT development. The Patent is a title that recognizes the legitimate copyright an invention or discovery and ensures the inventor or applicant, a temporary monopoly on the exploitation of the invention to which the patent. Provided by such national or international agencies patents. The invention is a creation of thought that is often confused with innovation (Innovation), namely, successful use and application of this knowledge practice. The invention become a technical innovation only when it leads to a new product or service that can be exploited commercially and sold to consumers. That is, it draws an important part of its value from entrepreneurship.
Chapter 2  The Legislative System

2.1  Generic overview of the Greek patent system

The Key figure in the Greek patent system is the Hellenic Industrial Property Organization (HIPO). This organization aims to promote the IT development of Greece by handling the country’s patents. (Law 1733/87), concept of law:

1. Patents are granted for new fabrications that are susceptible of industrial application and contain inventive activity. The invention may refer to a product, method or an industrial application.

2. No inventions are considered within the meaning of paragraph 1:

   a. The discoveries, scientific theories and mathematical methods.

   b. The aesthetic creations.

   c. The plans, regulations and methods for performing mental acts, games and financial activities and the computer programs.

   d. The presentation of information.

3. An invention is considered as new if it doesn’t belong to the state of art. As state of art is considered everything that is known by written or oral description or with any other way, before the date of filing the patents or the priority date.

4. An inventions contains inventive activity if, during a specialist’s judgment, it isn’t apparent with an obvious way to an already existing state of the art.

5. An invention considered susceptible of industrial application if its subject cannot be produced or used in any sector of industrial activity.
a. The surgery and treatment methods of human or animal bodies.

b. The diagnostic methods practiced on human or animal bodies.

7. The exceptions of paragraph 6 do not apply to products and, especially, to substances or compositions used for practicing these 2 methods.

8. No patents are granted in these situations:

a. For inventions whose publicity or application contradicts public provision and morality.

b. For varieties of plants, animal species or biological methods of production of animals or plants, except for microbiological methods and products that are produced with these methods.

9. A patent is also granted for an invention that has been notified within six months before the application for the patent if the notification is due to:

a. Evident abuse of the applicant or his/her licensor.

b. An introduction of the invention in an officially recognized exhibition within the meaning of the contract about the international exhibitions that was signed in Paris in November 22 1928, and was ratified by law 5562/1932. In this case, the applicant has to state be showed that his invention in an exhibition and produce a relevant certificate when filing the application.

To be more explanatory, HIPO provides with utility models certificates, deals with technology transfer contracts and has a liaison with international organizations. Its role is informative in some cases on the ground that elicits information on handling confidential records to inventors.

HIPO consists of the below members:
Two representatives of the ministry of development

One expert in industrial property matters

One searcher specialized in research

One experienced executive of Industry

One technical scientist approved by the Technical Chamber of Greece

One internal employee being selected by HIPO

It is important to highlight that HIPO has some extraordinary resources emanating from the following funding sources:

- Fees and income gained by service execution
- Financial funding from the budget of the Public Investments Program
- Incomes coming from donations, legacies and contributions.

HIPO provides with the standards of the novelty of an invention and its fatherhood. HIPO also classifies two distinct types of invention:

Service invention: Refers to a contractual affinity between the employee and the employer for the development of the invention

Dependent invention: Refers to the invention made by an employee utilizing the resources of an enterprise.

This paper previously shed light on the necessity of granting a patent filling an application form. Nevertheless, it is essential to explain that procedure in more elaborate detail.

2.2 European patent policy implications

A balanced score card is often used to evaluate the overall performance of the business and its progress towards objectives. Recent studies and leading
management theorists have advocated that strategy needs to start with stakeholders expectations and use a modified balanced scorecard that includes all stakeholders. The patent strength affects innovators by giving limited incentive on the ground that they cannot assess the value of their innovation; therefore, weak patents create an environment in which competitive firms are not well aware of the capabilities of their competitors. These patents are included in one of several categories: Patents that are legally questionable and subject to litigation by competitors. Patents based on “first impression” that can lead to a ubiquity of private information. Weak patents increase the cost of disclosing knowledge. Weak patents force firms to rely on secrecy and augment the cost of secrecy dependence. The lack of strength in a patent can bring in imitation of the “naked idea” or “raw figment”. Weak property rights reduce the prize available to a patent holder; Patent damage awards have become an increasingly important feature of business strategy in the USA over the past 20 years. While jury awards in excess of $100 million were relatively rare before 1990, they are now quite common. These large awards usually arise when damages have been calculated using a lost profits approach. Increased competition from an infringer can cause a patent holder to lose profits in several ways. By far the most important source of lost profits is the sales that the patent holder lost to the infringer. Absent the infringement (often termed the ‘but-for’ world), the patent holder would have made some or all of the sales that the infringer made. The damages associated with these lost sales are the incremental profits that the patent holder would have made on the sales. A second important source of lost profits is what is often called ‘price erosion’. Intellectual property rights are exclusive rights, often temporary, granted by the state for the exploitation of intellectual creations. Intellectual property rights fall into two categories: rights relating to industrial property (invention patents, industrial designs and models, trademarks and geographical indications) and those relating to literary and artistic property (copyright). The Agreement on
Trade-Related Aspects of Intellectual Property Rights (TRIPS) covers the main categories of intellectual property law. In an unsteady patent protection environment, revealing of innovation can cause the buyer to freely expropriate the invention. The lack of strength in a patent can increase the cost of infringement (not the one paid by the infringer but the one aggravating the inventor). The existence of weak patent rights complicates the analysis of whether a particular patent dispute settlement constitutes an antitrust violation; weak property rights and private information affect inter-organizational structure and relationship decisions because weak property rights can lead to a breach of confidentiality. Weak property rights open the door for an employee of a firm to misuse the client’s proprietary information (Deminski et Al, 1999). The deficiency in strength in a patent system can make it difficult for an employer who owns a property right to enforce it effectively. Let’s take the example of a company that manufactures paper products, from writing paper to cardboard boxes, at a factory location on a river. The problem is that, as a by-product of its manufacturing operations, the factory dumps chemical pollutants into the river. But no single person or entity owns the river water, so there is no one to force the company to stop polluting. Moreover, since cleaning up the river would cost money, the company can sell its paper products more cheaply than if it had to absorb such pollution-control costs. As a result, the paper company can further increase its output, responding to the relatively higher demand at its lower prices, leading to more waste and pollution from its factory. The company may also have an unfair advantage over competitors whose paper products do reflect the cost of installing pollution control equipment. A strong patent system doubles up the benefit of an employee for remaining silent without disclosing the information regarding the innovation before its implementation with no “shop rights” established an employer can freely expropriate an employee liable invention. The extent of the incentive given to innovators the range of liable litigation of an innovation and the extent
of private information ubiquity depend from the cost of disclosing knowledge. Knowledge disclosure plays a central role in models of economic growth. In this paper, we provide a theoretical model that evaluates the conditions supporting disclosures of privately funded knowledge through scientific publication, patenting, or both. Our analysis is grounded in the conflicting incentives facing researchers and their funders: scientists have incentives to disclose discoveries through scientific publication while firms have incentives to protect their ideas through patenting or secrecy. We focus on the strategic interaction between researchers and firms bargaining over whether (and how) knowledge will be disclosed. We evaluate four different disclosure strategies: secrecy, commercial science (patenting), open science (scientific publication) and patent-paper pairs (disclosure along both dimensions). Our model then derives the conditions under which each of these outcomes emerges and offers insights into the determinants of the disclosure strategy of a firm. Importantly, we find that patents and publications are complementary instruments in facilitating the disclosure of scientific knowledge; thereby providing a microeconomic unpinning of assumptions commonly made in endogenous growth models as well as a framework for understanding the impact of patent protection on the openness of science. The cost of secrecy dependence. The cost of infringement. Patent infringement in the commission of a prohibited act with respect to a patented invention without permission from the patent holder. Permission may typically be granted in the form of a license. The definition of patent infringement may vary by jurisdiction, but it typically includes using or selling the patented invention. In many countries, a use is required to be commercial (or to have a commercial purpose) to constitute patent infringement. The scope of the patented invention or the extent of protection is defined in the claims of the granted patent. In other words, the terms of the claims inform the public of what is not allowed without the permission of the patent holder. Patents are territorial, and infringement is only
possible in a country where a patent is in force. For example, if a patent is filed in the United States, then anyone in the United States is prohibited from making, using, selling or importing the patented item, while people in other countries may be free to make the patented item in their country. Because the patent office in each country or region examines the patent in question and may have some difference of patentability. The scope of protection may vary from country to country, making, a patent difficult to enforce worldwide. The benefit of an employee remaining silent. The extent to which patent policy system affects the inter-organizational structure; the patent strength affects innovators by giving limited incentive on the grounds they cannot assess the value of their innovation; the extent of the incentive which given to innovators creates an environment where in competitive firms are unaware of the capabilities of their competitors; the range of liable litigation of an innovation. Within the general framework for the support measures designed to improve the patent system, we have the promotion of intellectual property rights (IPR), especially the promotion of the intellectual property rights of patents which is a part of the framework of the Lisbon strategy for growth and employment as it uses innovation as the driving force for European growth. In 2008, a separate and complete announcement regarding the intellectual procedure rights is predicted. This announcement complements the current one and raises the main issues with a non-legislative and horizontal character in all fields of intellectual property.

2.3 Effects

Patents can have a positive impact on competition “when they enhance the entrance to the market and the creation of companies, and to enhance the technology spillovers”. Patenting is the equivalent of revealing inventions that an inventor otherwise, would have kept secret. Industrial research shows that the reluctance of companies to (enshrine) their inventions with patents mainly stems from the fear of giving information to their competitors. The research by
OECD/BIAC in 2003 into the perception of patents in companies confirms this fact (Sheehan Guellec & Martinez 2003). Patents can also ease the transactions on markets with technology products. They can be bought and sold as title deeds or even be subject to licensing agreements that allow the owner of the license to use the patented invention in exchange for a reward (Arora Fosfuri & Gambardella 2001: Vonortas 2003). Finally, the enhancement of technology spillovers is the goal to give them with licenses to the companies which will develop them further and commercialize them. During the last two decades, most patent offices have faced a great increase in patent application. New technologies incited the greatest rate of increase and to some extent, the economies that currently have an important position in the international technology landscape like Korea and Taiwan. The legal aspect of a patent does not refer to the prerogative given to the inventor to make use of its invention. On the other hand, patent is a mean of excluding others (except the pioneer) from manipulating the invention (Herman v. Youngstown Car Mfg. Co., 191 F. 579, 584-85, 112 CCA 185 (6th Cir. 1911). In the same respect, patent is a governmental entitlement given to inventors to disseminate the outcomes of their invention among the public. There are three principal ways to obtain a patent:

**Selling:** the owner sells all exclusive rights for the manipulation of the invention

**License providence:** the owner endorses or approve the manipulation of his/her invention at a specific time under specific circumstances.

**Technicity transfer contract:** the technicity owner propagates technicity over an individual or institution.
2.4 Enforcement

Civil lawsuits are the primary means of enforcing a patent. The patent owner is a cardinal figure in the enforcement of a patent being aware that State is entitled to raise objection or criticism over the validity of the patent. In that way patent agreements can be compared with contracts between the patent owner and the state recognizing state can question patent validity in any case.

2.5 Ownership

The validity magnitude of a patent as a property is augmented by the capacity of an inventor to assign ownership prerogatives. Those prerogatives can be assigned to employers or even a company.

2.6 Application and prosecution

The first step in establishing a patent is for the patent owner to fill in a written application form at the corresponding patent office. That procedure is called “patent pending. The claims included in the application feature the “scope of protection” (1) IP Australia website: What does 'patent pending' mean? (Consulted on August 5, 2009.) (2) USPTO web site, Patent Marking and "Patent Pending" (Excerpted from General Information Concerning Patents print brochure), Consulted on August 5, 2009. (3) UK Intellectual Property Office web site, Display your rights, (under "IPO Home Types of IP Patents Managing your patents> Using and enforcing") Consulted on August 5, 2009.)

After filling the application the next step is to impose the national and European legislative context on the patent so the patent may be granted endorsement and come into practice. The relevant patent office examining whether the patent application complies with specific standards and requisitions overseas this process. Those requisitions are based upon the standards defined by the ISO organization for patents. The final step is the
“renewal fees” that should be paid respectively to the legislative context of each country.

2.7 Incentives

The new technologies and the exploration into potential development sectors are the basic pioneering incentives from which a new idea must start so that we can use the right criteria to understanding our surrounding world. To improve the quality of humans’ lives, determining their motives, dilemmas as well as the best ways of granting assistance, is absolutely necessary. Inventors are free to disclose their inventions, if they are confident they are for the benefit of science and technology, provided they don’t thereby trespass conditions or agreements relating to the funding of their research work. The main goal is the support of the technological needs, mainly for the media, and the promotion of innovation to strengthen the competitiveness of the companies with the production of services and products of higher added value as well as the economy and the society. Each patent system provides inventors with four main incentives: (1) Pioneer incentive; (2) Disclosing former invention; (3) Experimental funding and opening invention to market; (4) Ameliorating former patent.


The deficiency in strength in a patent system can make it difficult for an employer who owns a property right to enforce it effectively.

A strong patent system doubles up the benefit of an employee for remaining silent without disclosing the information regarding the innovation before its implementation
With no “shop rights” established an employer can freely expropriate an employee liable invention.

2.8 The patenting of intellectual property provisions super legislative force

The protection of intellectual property is guaranteed through a series of international covenants ratified by Greece and its acquired superlegislative force. The copyright in both the asset, and morale, with the particular individual powers in the making, "awarded" (more correctly recognized) the author just because it contributes to the production of cultural work.

In Greece systematically innovative companies have a competitive leading edge with a significant international presence (Intracom, Lavipharm, Yiotis, Folie-Folie, Kleeman, etc.) modern business management, and priority on innovation as seen in the figures below,

![Figure 1. Number of patent applications in Greece, 2003-2009](image-url)
This bar chart reflects the number of patent applications from 2003 to 2009. In 2003, the number of patent applications was 538, compared with 514 in 2002. From then on, the number increased significantly and peaked at 827 in 2009. There was a slight decrease by 100 in 2009, as a result of the global financial crisis. However, the general growth trend in patent applications, with the number increasing by more than 30% from 2003 to 2009.

Figure 2: Total number of patent applications in Greece from 2007-2009, per WIPO category

Figure 2 compares the number of new patent applications in various industries from 2007 to 2009. Compared with the year 2009 to 2008, the number of patent application increased in the transportation, textile paper industry, fixed structures, engineering and electricity and decreased in the biology and chemistry industries. On the other hand, rather than the majority development in patent applications, in the year 2009, all industries received fewer new
patent applications and dropped an average of 66%. In transportation, textile paper and physics, the number of applications diminished by more than 70%. Considering the industry, biology, transportation, fixed structures and engineering industry contributed the largest shares of new patent applications. It other words these industries have comparative advantages in Greece and have potential development possibilities.

Figure 3. Annual data on employment in technology.

In this figure we display the results according the data analysis on high technology areas or "high tech" in the European Union (EU). The creation, development for the commercialization of new technologies has become essential in the global race for competitiveness and high technology sectors and businesses which are drivers of economic growth, productivity and social protection, and generally a source of high added value and well-paid employment. The High-tech can be defined according to three different approaches sectoral approach, consider the high-tech manufacturing and
knowledge of high technology services, focusing on profits and employment, as shown in above figure 3. In Greece, the approach of high technology products, distinguished by the number of high tech patents, and patents in the field of industrial information.

2.10 History

The need for a patent system has been recognized through our history. The first example is found in the Greek city of Sybaris in 500 BC. That case was encircled on the fact that the profits gained by an invention (refinement in luxury) were secured to the inventor by patent. (Charles Anthon, A Classical Dictionary: Containing an Account of the Principal Proper Names Mentioned in Ancient Authors, and Intended to Elucidate All The Important Points Connected with The Geography, History, Biography, Mythology, and Fine Arts of the Greeks and Romans Together with an Account of Coins, Weights, and Measures, with Tabular Values of The Same, Harper & Bros, 1841, p. 1273). A very important finding is The Antikythera Mechanism (aka astrolabe and the Antikythera Mechanism) is an ancient artifact believed to be a computer engineer and an instrument of astronomical observations, based on the form of Greek inscriptions bearing dates between 150 BC and 100 BC. Using mainstream digital imagine and a special scanner, which was built specifically to study the mechanism of Antokythera, British Scientists at Cardiff University confirmed that the mechanism of Antikithyra has 30 gears that revolve around its 10 axes. The operation of the device resulted in at least five phase, with one or more indicators for each. The scanner was used to read several of the inscriptions that were on the plates and rotating disks, which include astronomical and mechanical conditions, and identified by experts as a kind of "user manual" of the institution. This mechanism gave at its prevailing modern view, the position of the sun and moon and the phases of the moon. Could show eclipse the sun and moon based on the Babylonian Saros cycle. The dial also displays at least two calendars, one based on the Greek Meton
cycle and an Egyptian, which was the common "scientific" journal of the Hellenistic era.

Over the decades more countries have affirmed the necessity of a patent system. Some of them are Italy, England, Australia, North America, France and the United States.

Figure 4. the mechanism of Antikithyra
Chapter 3  Literature Review and Analysis Concepts

in all possible aspects of the following schematic depiction: The increase in R & D expenditure has contributed significantly to the increase in applications for patents, but cannot fully explain it. The changes in the competitive landscape seem to play a key role in the development of trends for patenting industries of ICT systems. Some studies have reported that between creating patents and strategic behavior of patentability for companies in the Information Technology industry of the USA and European mobile phone industry. The changes in patent regimes may have contributed unfaithful to increase, resulting in a higher value for patents and making them easier, or less costly to obtain. The central strategic goal is to develop a sound and comprehensive business plan that covers the following areas: knowledge, education, culture, production, marketing trade and consumption.

Specifically the strategic objectives of the cooperation project are:

- Develop a common strategy and take a leading role in events
- Archive critical mass and economies of scale,
- Address common problems and create a common vision
- Create an environment of knowledge, creativity and openness through the prism of quality
- Exchange and transfer experience and technical knowledge effectively.
- Create and acquire high value-added companies
- Establish permanent cooperation links with multiple benefits
- Prepare and update the country and the National Strategic Planning
- Convert the development of sustainable entrepreneurship and technology to tourism, environment and agriculture.

Considering the foregoing, the main target for cultivating new entrepreneurial activity, could be represented
Figure 5. Strategic targets

Innovation, patent, renewal, transformation, reorganization and redefinition of business are events that reflect the structure of phenomena and demand works through a strategy of establishing a new venture. The above schematic depiction illustrates the birth of new ventures through the process of renewal, reform and innovation. Endogenous technology and high technology companies define their spatial needs and trends that dictate the location of high tech companies are also determined and the concept of high-tech industry is used to describe all the units based on the most advanced technology. The subjects included in this industry are: Microelectronic, Computers, Nanotechnology, Mechanical - electronics (industrial robots, Automotive electronics and medical industry), Fibre optics and telecommunications equipment, Biotechnology, New materials, aerospace and software for computer, Social development systems (medical services, traffic control and telecommunication systems) ".

The methods used for determining high-tech industries can be grouped into two broad categories a) Measures related to the inputs of technological activity, such as expenditure on R & D carried out by a company or the percentage employed in parts of this research. b) Measures related to business
performance, as the growth of the product, the added value achieved by the number of patents guaranteed. These methods led us to the statistical analysis of variance (ANOVA) using the following variables: increase in sales / competitiveness, innovation of product innovativeness, participation in international networks of ventures, depended firm, employment size, cost of R & D expenditure, number of patent, Proportional of scientists and technicians, production technology

Where the variable e innovation of product innovativeness takes values between 1 = innovative and 0 = non-innovative

3.1 Research Objective
Examine the economic performance of innovation and patents in (high-tech) companies Greece and European Union countries

3.2 Research Question
Analysis of the competitiveness link of innovation and patent activity reflected in the increasing adoption of Information Technology Sector companies to have better financial performance than other companies, both across countries but Greece in particular

3.3 Analysis Concepts - Methodology of determinants
On the basis of the conceptual framework developed above, this section presents the aggregated results of data analysis of the research study on innovativeness and protection from a potential legal framework to safeguard intellectual property rights of small businesses in the member states of the European Union.
The economic performance and competitiveness of enterprises considered in light of the innovation capacities, taking into account the environment in which they operate.
The results of the analysis constitute a series of direct and indirect linkages between the determinants of technological capacity and economic performance of enterprises in current conditions of the new economy. Our primary finding is that competitiveness is proportional to the volume of knowledge and technology in business - and not the low cost of production. In other words, the analysis documented that businesses sector intensive technology (including electronics) is more innovative. As confirmed by the results, the more technology-intensive is the activity of company, the higher the growth rate of sales of that company was regardless of the economic environment in which it operates. Analyzing the innovation capacity of firms, we focus on the importance and interaction of legal instruments to safeguard the legal framework for the intellectual protection right and transfer knowledge by all member countries. The results show that the efforts of companies to develop indigenous technology are important for innovativeness by exogenous technological inputs (licensees etc.) The development of indigenous technology requires regular in-house activity R & D, a high proportion of scientists at all staff levels, and the utilization of personnel in processes of technological development. These procedures are mobilizing the resources of the company and lead to innovation, while the mere adoption of technological inputs from external sources often hamper innovation. The assessment of the function of the competitiveness of businesses confirms that the small-scale employment usually involves family organization and management (non-specialized strains), traditional production (labor, cheap cost and low added value) and insufficient modernization (low cost in new skills and technologies) - associated with negative economic performance. While larger enterprises usually have better access to information and funding, and a greater ability to
evaluate market conditions and thus adopt strategic technological and adaptation-proven competitive deal of additional. The evaluation examined the involvement of SMEs in technological cooperation networks. The evaluation found that the international technological interactions are important for business technology and economic performance. Furthermore, networks of local inter-company relations are associated with low technological activity. In other words, the international network is important for technological development and competitiveness of the local Inter-O rganizational Networks. Even the infrequent interaction with international technology leaders gives the company the opportunity more "exposure" to information and knowledge.

The empirical evidence of our research shows that the traditional economic activities (labor) tend to develop mainly among local business to business networks. But despite the high 'locality' usually featuring traditional labor-intensive industries, networks that develop are limited and rarely contribute to support the specialization of exports.

In contrast, dynamic enterprises (intensive technology) tend to develop links with international technological networks. In any case, consolidatinge business to technological trading at the local level is a positive basis for future development of international trade - especially through the internationalization of locally produced innovations.

On the basis of primary research on SMEs in the ICT field in Europe, the statistically documented correlations between the determinants of business patent innovativeness and competitiveness econometrically identified the following system of simultaneous equations:
Chapter 4  Model

Figure 6. The model

Calculating the Variables (bei) and (bis), takes values between 1 = innovation 0 = not innovative for to see when: Increase in Sales / Competitiveness (bis), and Innovation of product Innovativeness (bei). In this model we can see that the expenditures from innovation / innovativeness function of ICT patent confirm that both endogenous as well as and exogenous factors can affected positively the innovative capacity of business to a significance level of 99%, however in this model we can see also that indigenous technological effort has a significant effect on the external input technology innovativeness of the company.
Estimate the innovation / innovativeness in the function of cost of Information Technology Patent.

4.1 Formulating

**bis**: increase in sales / competitiveness

*This variable* determines the technological capacity and economic performance of enterprises in modern conditions of the new economy and international competition.

**bei**: innovation of product innovativeness

Analyzing the innovation capacity of firms, we focus the importance and interaction of exogenous and endogenous factors. The results show that the efforts of businesses to develop endogenous technology are important for innovativeness by exogenous technological licensees.

**bosat**: participation in international networks of ventures

*This access* and business involvement in local and international networks technological cooperation and its potential in the size and type of operation. Demonstrated that the greater of business involvement in such networks, giving more opportunities for technological upgrading and innovation.

**bdefir**: depended firm

The economic performance and competitiveness of companies examined in light of innovative capabilities in consideration of
dependent structural and functional-institutional conditions
environment in which they operate

**bes**: employment size

For the role of firm characteristics such as size and operational status (independent or subsidiary) in innovative and competitive ability, the empirical evidence relevant research show that small firms grow technology differently than large ones. The small size restricts investments in technology and R & D and access to information and technological developments. The developing access to external resources and partners are crucial to overcome the obstacles posed by small business size.

**crdl**: cost of R & D expenditure

The existence of strong statutory base R & D plays a key role in adoption of advanced knowledge and advanced technology

**cip**: number of patent

Identify entrepreneurial innovativeness and exogenous factors that primarily consist of technological inputs from outside to the company sources. These inflows recorded predominantly in patents and licenses technology that the company purchases and implements

**cposat**: proportional of scientists and technicians
The endogenous technology requires regular in-house activity R & D, high proportion of scientists at all staff, and utilization of personnel in technological process development.

**coprot**: production technology

Upgrading production systems by skilled low-cost production, technological dependency rates modernization market.

On the basis of the conceptual framework developed in this section presents the aggregated results of data analysis of the research study on innovativeness and protection from a potential legal framework to safeguard intellectual property rights of high-tech low-u Member States to the European Union. In primary research on SMEs in Europe, the statistically documented direct and indirect correlations between factors innovativeness and competitiveness of business specified in the following econometric system of simultaneous formulas:

**The formulas are defined as:**

\[ \text{bis}_{(i)} = \alpha_1 + \beta_1 \text{bosat}_i + \gamma_1 \text{bei}_i + \delta_1 \text{bdefir}_i + \mu_1 \text{bes}_i + \lambda_{1i} \quad [1.1] \]

\[ \text{bei}_{(i)} = \alpha_2 + \beta_2 \text{crdl}_i + \gamma_2 \text{cip}_i + \delta_2 \text{cposat}_i + \mu_2 \text{coprat}_i + \lambda_{2i} \quad [1.2] \]

\( (i)=\text{the firm}, \)

\( \lambda_{1i} \text{ and } \lambda_{2i} = \text{non-interpreted part of the functions} \)
Business sectors compared (High Technology) and (Low Technology) of information technology Systems as below:

a) Increase in Sales / Competitiveness (bis),

b) Innovation of product Innovativeness (bei)

Figure 7. Business sectors compared (High Technology) and (Low Technology)

Looking at figure (4) applying Analysis of variance the competitive gap (bis) and innovativeness (bei) between business sectors of high and low technology we find that low-tech firms are less dynamic in economic and technological conditions of the companies high-tech sectors.
Chapter 5  Results

Examining statistics applying, the difference in competitiveness and innovativeness increase in sales the competiveness (bei) between business sectors high (High-Tech) and low (Low-Tech) technological intensity, see how companies in other sectors working poor technology is less dynamic in economic and technological conditions of businesses intensive high tech industries.

<table>
<thead>
<tr>
<th>bei</th>
<th>High Tech ICT Sector</th>
<th>Low Tech Sector</th>
<th>High Tech / Low Tech</th>
</tr>
</thead>
<tbody>
<tr>
<td>GREECE</td>
<td>0.58</td>
<td>0.24</td>
<td>2.41</td>
</tr>
<tr>
<td>TOTAL</td>
<td>0.77</td>
<td>0.46</td>
<td>1.67</td>
</tr>
</tbody>
</table>

Table 2. Innovation of product innovativeness (bei)

Variable (bei) takes values between 1 = innovation  0 = not innovative

In Table 2. the corresponding results for businesses in Greece and throughout the countries of our survey show that in each case (ICT / NICT) the innovativeness of high-tech firms are statistically different and greater than that of low-tech firms. The result for the whole country was confirmed in 95% significance level.

<table>
<thead>
<tr>
<th>bis</th>
<th>High Tech ICT Sector</th>
<th>Low Tech Sector</th>
<th>High Tech / Low Tech</th>
</tr>
</thead>
<tbody>
<tr>
<td>GREECE</td>
<td>1.83</td>
<td>0.99</td>
<td>1.85</td>
</tr>
<tr>
<td>TOTAL</td>
<td>2.68</td>
<td>1.35</td>
<td>1.98</td>
</tr>
</tbody>
</table>

Table 2.1. Increase in sales / competitiveness (bis)
Also, Table 2.1, the ANOVA results show that high-tech companies have better financial performance than low-tech companies, both across countries examining our research and Greece in particular. The result for all countries confirmed at significance level 99.

Figure 8. Increase in sales / competitiveness (bis)

In figure 5 show the financial performance between ICT sector high tech companies and low tech other sectors companies.

In a further step, the creation and appreciation of simple econometric relations, the role of endogenous effort of the company for technology development, compared with the contribution of exogenous technological inputs, the innovativeness and competitiveness. In econometric our model equation 1.2 the system of equations, the innovativeness of the company (bis) is estimated as a function of endogenous technological effort (In_house R & D = crdl + cposat) and exogenous technological inputs (registered patents-cip and informal adoption of production technologies - coprot).
Estimate Innovation / innovativeness in the function of ICT patent

| bei | 0.310 cip (Patent) | 0.365 R&D expenditure |

Table 2.2. R&D Expenditures from innovation / innovativeness function of ICT patent

In the Table 2.2 confirm that both endogenous and exogenous factors affect positively the innovative capacity of business to a significance level of 99% however it seems also that indigenous technological effort has a significant effect on the external input technology innovativeness of the company.

Estimate the innovation / innovativeness in the function of cost of Information Technology Patent

| bei | 0.325 bosat |

Table 2.3. Proportion of scientists and technicians (posat)

Remarkable in our econometric analysis is the assessment of importance of participation in international business (Posat) network of technology partnerships for the innovativeness and competitiveness. The results in the Table 2.3 show that the positive contribution of international networking is static significant at 95%.

As shown by statistical analysis tis variance (ANOVA) results show that the efforts of companies to develop endogenous technology are important for innovativeness by exogenous technological inputs (licensees etc.)
Chapter 6 Conclusion

In conclusion, we note that the association of competitiveness with innovation activity is reflected in the increasing adoption of registered patents (patents) in production, the ability to absorb technology and innovation are essential for the competitiveness of economies and firms operating in them. The innovative capacity of business consists primarily of the endogenous development of knowledge and technology, achieved through the involvement of skilled personnel and investment in R&D. Exogenous technological inputs are also important, but require a similar-company effort to use. The density and quality of networking among actors (businesses, educational institutions, investment funds of a production system is crucial for the transfer, absorption and diffusion of knowledge. In particular, the participation of enterprises in international networks of knowledge and information exchange gives real impetus to innovativeness. Consequently, political planning should aim at strengthening the infrastructure and networks that support the cooperation of local businesses with international suppliers of technology and knowledge. They must also facilitate the internationalization of the product of innovative local companies. The condition for establishing international relations technological cooperation s to improve the efforts of business for endogenous technological development (technology investments with incentives, R&D costs of training staff, etc.). In this direction is crucial to address the deficiencies in training and human resource skills, by extension, the national / regional knowledge base and technology. Also required is an upgrade production systems characterized by specialization in low-cost production, technological dependence and slow modernization of the market In other words, institutional and structural reforms are equally necessary to overcome the difficulties of technological
development and competitiveness that most face sized enterprises sayings. The patent strength affects innovators by giving limited incentive on the ground that they cannot assess the value of their innovation, the patents create an environment in which competitive firms are not well aware of the capabilities of their competitors.
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