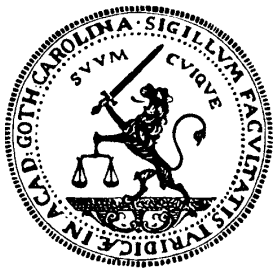


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# Is there an optimal patent length?

Master thesis
30 credits

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# Contents

# Summary

In today's society innovation is increasingly important for a developed, as well as a developing, country and it is a significant contributor to economic growth and the evolution of society. The accounted value of companies increasingly consists of immaterial property and our access to existing knowledge is ever greater and ever easier. Since ideas and innovations are of such great importance to markets and their actors, it is equally important for them to be able to protect and profit from their innovations. The lack of the incentive to improve upon existing ideas may result in a considerable deadweight loss for society. Therefore man has created the concept of intellectual property to create and reinforce the incentive to innovate. However, as with all things, a balance between awarding and hindering progress must be achieved. In the case of patents they award exclusivity of the use of innovations and grants the innovator the possibility to sell, license or use that innovation as he wishes within certain frameworks, one of them being within a certain time frame. This way the owner of a patent may potentially benefit from his innovation. Conversely, patents hinder others from using an idea and further build and develop on that idea during the stipulated time of exclusivity, which clearly affects the rate of innovation negatively within a society. This is why it is important to find the exact length of a patent, where the positive aspects outweigh the negative ones.

The trade-off between awarding exclusivity and promoting innovation through patents is regulated in different areas. For instance, the use of patents is limited by competition regulations whereas patent laws regulate the width and the necessary innovative step. This paper focuses on yet another issue in this field, the time limitation of a patent. So how long should a patent be to induce innovation? Too short and there might not be enough incentive to innovate. Too long and the innovation rate in society will be reduced since most innovation is incremental and thrives through the ability to utilize and improve on earlier innovations.

Patents are an old concept on which markets have relied for a long time. In addition, patent systems and lengths have been rather similar across the industrialized world. Since patent systems have been so alike through the years, also across different markets, one can hardly compare them in order to improve them. Even so, many researchers have tried to examine and present a theory covering the issue of an optimal patent length, but the complexity of the discussion is too great and the unknown factors are too many to be solved in a satisfactory manner by a single theory. No single innovation theory seems to be able to answer the multiple considerations a wide variety of products, processes, and markets demand.

The famous economist Joseph A. Schumpeter proposes a system based not on inventors but on investors in innovation. I believe that Schumpeter's theory is a good starting point in the quest of finding an optimal patent

length. A patent should be precisely long enough to induce investments in innovation. However, it still doesn't solve the problem with different needs and wants for different industries and different investors.

Every industry, from napkins to pharmaceuticals, are different from one another which complicates and maybe even renders it impossible to find a single optimal patent length. In my opinion, there simply isn't a one-size-fits-all solution to the problem as suggested in article 63 EPC. However, there is no simple way of dividing the industries into several different 'patent groups' either. On what basis should this partition be made? To be very specific is extremely difficult since not only every industry is different but every investor and every innovation is different. To create a vast system that considers each of these situations is impractical and most likely impossible.

I suggest, despite all of this, that such a partition into different 'patent groups' should be made. To determine exactly which innovation that should adhere to what 'patent group' requires further investigations but it is clear to me that vastly different industries with equally different markets shouldn't coexist under the same regulations. I propose a partition based on industries and a patent length that makes it potentially interesting to invest in innovation within that industry; basically award investors the opportunity to regain their investments and make a reasonable profit. Clearly, this isn't an easy task. There cannot be too many 'patent groups' if the system shall remain practical. Even if it is only the long life-cycle pharmaceutical and biotech industries that get singled out into a different group it would still confer an improvement upon society, as any increase in innovation is commendable.

Once the 'patent groups' problem is resolved, further investigation is required in order to determine which length the different groups should be awarded. Today's' research in the matter is inconclusive and there is very little real experience to draw from. Nonetheless, in my view there is enough evidence supporting a reduction in the length of patents in short life cycle industries. Boldrin and Levine show in their paper that due to the increase in the size of the markets, thanks to globalization and free trade agreements, the time it takes to recover investments in successful innovations has decreased. Society as a whole moves much faster and the pace of exchange in information makes twenty years seem like a much longer time than it used to, even than it did just sixteen years ago when the TRIPS Agreement was adopted. However, this is not the case for all industries, for instance in the pharmaceutical industry where the development of new products is increasingly complex. This is why I suggest that there simply isn't one single optimal patent length. The system would be more just and more efficient if it adhered to this reality.

# Sammanfattning

I dagens samhälle är innovation av tilltagande värde för såväl industrialiserade som utvecklingsländer och ett innovativt samhällsklimat innebär ett betydande bidrag till den ekonomiska tillväxten och till samhällsutvecklingen i stort. Det bokförda värdet hos dagens bolag består till en stor och växande del av immateriella tillgångar och det blir ständigt lättare att tillgå mer och bättre kunskap. Eftersom nya idéer och innovationer är av sådan betydande vikt för den ekonomiska marknaden och för dess aktörer är det lika viktigt att de ska kunna skydda sina innovationer samt profitera från dessa, för utan ekonomiska motiv att utveckla ny och förädla existerande kunskap riskerar samhället en substantiell *deadweight loss*. Därför har människan skapat immateriella rättigheter för att stimulera och inspirera till innovation. Dock är det, som med allt annat i denna värld, viktigt att hitta en balans mellan att stimulera och hindra utveckling. Ett patent, den immateriella rättighet som behandlas i detta arbete, berättigar ägaren den exklusiva rätten till användandet av den patenterade innovation. Ägaren kan således sälja, licensiera eller använda sig av innovation på det vis innehavaren önskar inom vissa ramar. En av dessa ramar är att rätten är tidsbegränsad. På detta vis får ägaren av ett patent möjligheten att profitera från innovationen. Patent kan dock användas för att hindra andra från att utnyttja och fortsatt utveckla en idé under exklusivitetsperioden vilket klart påverkar samhällsutvecklingen. Svårigheten ligger i att finna den exakta längden på ett patent där de positiva konsekvenserna överväger de negativa.

Denna balans är reglerad på ett antal olika sätt. Användningen av ett patent är t.ex. reglerat inom konkurrensrätten, samtidigt som bredd, nyhet och uppfinningshöjd i en innovation är reglerade av patentlagar. Detta examensarbete fokuserar på ytterligare en av dessa begränsningar, nämligen tidsbegränsningen. Hur långt bör ett patent vara för att stimulera innovation? För kort och det riskerar att uppfattas som ofördelaktigt att satsa på innovation. För långt och innovationsgraden kommer att reduceras då majoriteten av all innovation bygger på möjligheten att använda sig av och förbättra tidigare innovationer.

Patent är ett gammalt koncept och moderna marknader har förlitat sig på dem under en lång tid. Dessutom har patentsystemet och dess längd varit relativt likvärdiga inom den industrialiserade världen. Det är därför svårt att jämföra och dra slutsatser från hur olika system påverkar innovationsgraden på marknader. Även förändringar inom en och samma marknad har varit sällsynta. Trots detta har många forskare försökt undersöka och utvärdera samt i förlängning av detta presentera en teori angående den optimala patenttiden. Frågan är dock så pass komplex och de okända faktorerna är för många för att kunna besvaras av endast en teori. Ingen ensam teori verkar vara kapabel till att besvara de multipla betänkanden som ett extensivt utbud av produkter, processer och marknader kräver.

Den berömda ekonomen Joseph A. Schumpeter föreslår ett system som inte är baserat på innovatören utan på den som investerar i innovationer. Schumpeters teori är i min mening ett bra utgångsläge i jakten på den optimala patentlängden. Ett patent skall vara precis långt nog för att stimulera investeringar i innovationer. Schumpeters teori ger däremot inget svar på hur man skall lösa det faktum att olika industrier och dess investerare har olika förutsättningar och behov.

Varje industri, från servettillverkningsindustrin till läkemedelsindustrin, har olika premisser vilket komplicerar och kanske även omöjliggör jakten på en optimal patentlängd. Jag anser att det inte finns en *one-size-fits-all* lösning på problemet som är fallet i artikel 63 EPC. Det finns tyvärr inget enkelt sätt att dela upp de olika industrierna i olika ”patentgrupper” heller. På vilka grunder skall man göra en sådan uppdelning? Att vara väldigt specifik i indelningen är otroligt komplicerat eftersom inte bara varje industri skiljer sig från varandra utan även varje investerare. Att skapa ett system som tar hänsyn till alla dessa olika situationer är opraktiskt och troligen också omöjligt.

Jag föreslår trots allt detta, att en sådan uppdelning i olika ”patentgrupper” skall göras. Den exakta uppdelningen av vilka patent som skall tillhöra vilken ”grupp” kräver fortsatta utredningar men det står klart för mig att markant olika industrier med lika markant skilda marknader inte skall lyda under samma regleringar. Jag rekommenderar därför en uppdelning baserad på olika industriers förutsättningar samt en patentlängd som gör det rimligt att investera i innovation inom den specifika industrin. I stort sett skapa möjligheten för investerare att återfå sin investering tillsammans med en rimlig vinst. Detta är naturligtvis ingen lätt uppgift och det vore inte praktiskt att dela upp ett sådant system i för många ”patentgrupper” men även om det i slutändan bara är de industrier med långa livscykelprodukter såsom läkemedels- och bioteknologiindustrin som skiljs ut i en separat ”grupp” skulle det fortfarande innebära en förbättring för samhället, då varje ökning av innovationer i samhället är eftersträvansvärd.

När det kommer till en passande patentlängd för respektive ”grupp” är det också en fråga som kräver fortsatt utredning efter att indelningen skett. Forskningen i ämnet är inte entydig, utöver detta finns det väldigt få reella exempel att tillgå. Oavsett detta så är min åsikt att det finns tillräckligt med fakta som indikerar att en reducering av patentlängden inom korta livscykelindustrier är att rekommendera. Boldrin och Levine påvisar i sin artikel att på grund av att storleken på dagens marknader har ökat, tack vare globaliseringen och frihandelsavtal, har tiden det tar att räkna hem investeringar i lyckade innovationer förkortats. Samhället i sin helhet rör sig mycket fortare och takten i informationsutbytet har gjort att tjugo år framstår som en mycket längre tid idag, än vad det gjorde för bara sexton år sedan när TRIPS-avtalet antogs. Detta gäller dock inte för alla industrier, t.ex. inte inom läkemedelsindustrin där trenden visar att utvecklingen av nya produkter blir mer komplex och tar längre tid. Därför menar jag att det inte

finns en optimal patentlängd utan flera. Systemet skulle i min mening bli rättvisare och mer effektivt om det anpassade sig till detta.

# Abbreviations

| | |
|---|---|
| AZ | AstraZeneca |
| CFI | Court of First Instance |
| DoJ | Department of Justice |
| EC | European Community |
| EPC | European Patent Convention |
| EPO | European Patent Office |
| EU | European Union |
| FDA | Food and Drug Administration |
| FFDCA | Federal Food Drug and Cosmetics Act |
| DSB | Dispute Settlement Body |
| IP | Intellectual Property |
| IPR | Intellectual Property Rights |
| IT | Information Technology |
| NCEs | New Chemical Entities |
| OTC | Over The Counter |
| PL | Patentlag (1967:837) |
| PWCs | Personal Watercrafts |
| R&D | Research and Development |
| SMEs | Small and Medium Enterprises |
| SPC | Supplementary Protection Certificate |
| TEU | Treaty on the European Union |
| TRIPS | Trade Related aspects of Intellectual Property rights |
| U.S. | United States of America |
| WTO | World Trade Organization |

# 1 Introduction

## 1.1 Background

Patents are designed to protect ideas and innovations that, ones made public, are easy and inexpensive to duplicate. There are several classical philosophies aiming to justify a patent system. One popular theory is based on the notion of fairness, called the "Reward By Monopoly" theory, meaning that an inventor should be able to reap the fruits of his labour and recoup his R&D investments[1]. Another popular theory, the "Incentive To Invent" theory[2], which is the view of the EU Commission, says that "IPR is important for the progress of society by giving creative and inventive people the incentive to develop products that improves everyday life, contributes to economic growth and in the prolonging actually increases competition and creates dynamic efficiencies"[3] or as Abraham Lincoln put it; "the patent system added the fuel of interest to the fire of genius[4]". However, IPR is not an uncontroversial concept. The critics say that IPR is unnecessary and inhibits innovation by creating barriers for others to create new or further improve on existing products. Furthermore, a main concern is that IPR creates monopolies and is contradictive to the economic theories of a free market and free competition.

There is a constant debate on how to regulate the area, how should the IPRs be stipulated to best serve the underlying purpose of the regulations and how do IP and competition law actually interact and relate to each other? What is relevant to consider when improving on said rules? It is an area within the law family that is constantly evolving and with the fast changes of technology and markets in the modern society it is an area, like all others, that needs to keep up with its' times. Since the lifespan of many products has become shorter due to the fast development of new and improved products and rapid changing trends, does this also mean that the lifespan of patents should be shorter? At the same time the new innovations in certain areas, such as pharmaceuticals, are becoming more and more complex, leading to longer and more costly R&D, does that mean that patent times are to short to comply with its' purpose? A definition of an optimal patent length is "The optimal patent term is that point at which the marginal benefit

[1] See, Fisher Matthew, Fundamentals of Patent Law, Hart Publishing, Oxford and Portland. OR, 2007, p. 68
[2] *Ibid*, p. 73
[3] Guidelines on the application of Article 81 of the EC Treaty to technology transfer agreements, OJ EC 2004 No. C 101, p. 2, para. 7.
[4] Lincoln Abraham, Discoveries, Inventions and Improvements (1859), in The Complete Works of Abraham Lincoln 3rd ed., Francis D Tandy Co, New York, 1905, Vol 5, p. 113

from increased innovation is exactly offset by the marginal cost of the deadweight loss created by the patent right.[5]"

## 1.2 Purpose

The purpose of my essay is to evaluate the optimal protection time for patents from societies point of view. The main question I will try to answer will be; is the stipulated patent time in article 63 EPC the most beneficial for the progress of today's society? My hypothesis is that since the scope and use of patented products and processes differ in a huge variety of ways, there should also be a variety of patent lengths.

## 1.3 Delimitation

There is a wide spectrum of interesting discussions regarding IPR, competition law and how they shall best serve the public. However, due to limited space and time of this essay I will have to limit my focus. One of these limitations will be drawn around the length of patents, even though the protective lengths of the other branches within IPR, such as copyright are interesting indeed I need to draw the line here.

I'm also going to have to limit the scope of the question to the EU and the TRIPS Agreement. The comparison with the U.S. legal system will be limited to the patent laws that correspond with the European laws; patents on business methods and software are not discussed within this paper. There is also an important and intriguing debate on how to best use IPR as a tool for developing countries that will have to go on without me at this time. Finally, any suggestion in changes of the actual patent time does not take into account the probability of administering a change in the TRIPS Agreement; I'm only trying to answer the question of what a hypothetical change should look like.

## 1.4 Method and material

I have used a traditional legal dogmatic method as well as a law and economics method to broaden the perspective. I have looked at the EPC that is attuned to the WTO TRIPS Agreement where the minimum patent length of 20 years is stipulated. There is very little reasoning to be found regarding the decision on the appropriate length of patents. Publications from the European Commission and the U.S. Federal Trade Commission have been useful to understand their views on IPR and Competition policy. Furthermore I've relied quite heavily on literature on the issues surrounding

[5] Abrams David S., DID TRIPS SPUR INNOVATION? AN ANALYSIS OF PATENT DURATION AND **INCENTIVES** TO **INNOVATE**, University of Pennsylvania Law Review, June 2009, p. 1615.

innovation and particularly discussions relevant to the subject of the optimal patent length. I've also studied cases relevant to my thesis.

I've had the intention of exploring the optimal patent length in a larger context. The main question extends to several areas and to give a comprehensive answer that broadly deals with the issues at hand it is important to understand the implications from an IPR, a competition and an economic point of view. In this context I've also looked at underlying questions such as what is the purpose of the patent, what sort of progress is it that we wish to achieve? Are there other ways of achieving these goals?

Throughout this paper I will provide an insight into the U.S. patent discussion, which is quite similar and supplements the European discussion, as the TRIPS Agreement is a shared foundation of the respective legislations and the American perspective is therefore not meant to be comparative but additional to the European perspective.

Finally, I've looked at existing theories and ideas on the optimal patent length to show the complexity of, and multiple approaches towards, the posed question and at the same time draw conclusions and build from these previous experiences.

## 1.5 Disposition

In chapter 2 I will provide an overview of the relevant EU and International regulations and the thinking behind them to give the reader the base of the discussion. Within this chapter I will also discuss the relationship and interaction between patent law and competition law. In the following chapter I intend to shine a little light on the practical use of patents and the impact this practice has had on competition and legislation concerning a few different innovative industries. In chapter 4 I've investigated the alternatives to patents and whether patents are necessary at all. The fifth chapter is dedicated to the optimal patent length and an examination of previous work in the subject. Finally, in chapter 6, I will give an analysis and an answer to the posed question and purpose of this essay.

# 2 Relevant Patent and Competition Regulations

## 2.1 Background

The entire discussion on optimal patent length to promote an innovative market originates in the fact that resources are scarce. This fact posses the fundamental problem for any market, how do we make the best use of the limited resources at our disposal? Different ideologies have tried to deal with this issue in different ways, in the end the theory of a free market has been proved to be the most successful one and is today the most widely spread. The reason why the free market theory has had such success is because it has been able to allocate resources in the most efficient way. However, the label "free" is somewhat misleading since a completely free market is not an efficient one, laws regulating competition among other areas has been deemed necessary for markets to prevent inefficiencies such as dead weight loss, rent seeking and monopolies. Competition is regarded to be the most important factor if one wishes to create an efficient allocation of resources. The benefits to society are economic growth and low prices on more and increasingly improved products. Efficiencies can be divided into static (low prices) and dynamic (innovative) efficiencies and "It is generally accepted and well-substantiated point of view that innovation is the main source of increases in economic welfare[6]". IP Law and Competition Law share the aim to promote innovation and dynamic markets even though they seem to do it in opposite ways, one by creating monopoly situations and the other by destroying them. How is this possible? Competition Law halters when it comes to promote dynamic efficiencies and that's where IPRs fill the void. The aim is to create incentives for innovation, which is an important aspect to keep a market competitive and thus efficient. This is where it gets complicated. How do we design the regulations so that they meet the goal of creating the most efficient market and the optimal balance between static and dynamic efficiencies? Lets first take a look on the relevant regulations of today.

[6] Kolstad, Olav, " 1. Competition law and intellectual property rights – outline of an economics-based approach" from the "Research handbook on intellectual property and competition law" edited by Drexl, Josef, Edward Elgar Publishing, Cheltenham, UK & Northampton, MA, USA, 2009, p. 4.

## 2.2 Patent Law

### 2.2.1 TRIPS Agreement

The most prominent patent regulation in the world is the TRIPS Agreement. It was adopted in 1994 within the realm of the WTO. The TRIPS Agreement is based on the Bern and Paris Conventions from the late 19th century but goes even further[7] then the previous two. A minimum of 20 years as the patent length is stipulated in art. 33 TRIPS. The Agreement applies to all WTO members.

### 2.2.2 European Patent Convention

Within the EU there is the European Patent Convention (EPC) that came into place in 1977 and constructed a European Patent Office (EPO) in Munich. "The EPC provides a single standard for patentability across the contracting states[8]". An inventor can send his application to the EPO who can grant "a bundle of national patents[9]". Once approved every national patent is subject to national law and enforcement. The signatory states of the EPO, which are the EU countries plus Switzerland, Lichtenstein and Monaco[10], met in 2000 to update the EPC to modern standards and adjust it to international agreements where TRIPS is the most significant one. This however was only partially successful since all issues couldn't be agreed upon, such as biotechnical inventions and patents regarding software[11].

Despite the EPCs goal of harmonizing IP law there is no common court to settle cases, resulting in a wide range of national interpretations of the EPC legislation, which practically means that several national differences still exists and the patents needs to be in the official language of each state if they haven't approved other languages.

### 2.2.3 EU Directives on Patents

In the TRIPS Agreement, which the EU is bound by, it states 20 years[12] as the minimum patent length. Even though the EPC isn't bound by the TRIPS Agreement, its' member states however are, it choose the minimum 20 years as its' patent length[13] with an opportunity for the signatory states to extend

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[7] See Bernitz, Ulf et. al. Immaterialrätt och otillbörlig konkurrens, 11th ed., Handelsbolaget Immateriellt Rättskydd i Stockholm, Stockholm, 2009, p. 14.
[8] Gowers, Andrew, Gowers Review of Intellectual Property, HM Treasury, London, 2006, p. 84
[9] *Ibid* p. 84
[10] Blanchard Adrienne M. Gill Kelly and Steinberg Jane, A Practical Guide to Intellectual Property Issues in the Pharmaceutical Industry, Sweet & Maxwell, London, 2007, p. 13
[11] MacQueen Hector, Waelde Charlotte & Laurie Graeme, Contemporary Intellectual Property, Oxford University Press, Oxford, UK, 2008, p. 389
[12] Art. 33 TRIPS Agreement
[13] Art. 63(1) EPC

the patent time under certain conditions[14]. The EU has used this opportunity to award the possibility of a maximum five-year prolongation called a supplementary protection certificate (SPC) regarding pharmaceutical or plant protective patents through the European Councils' Regulations 1768/92 and 1610/96. A SPC is designed to restore patent time lost to extensive regulatory approval. "The certificate takes effect at the end of the lawful term of the basic patent for a period equal to the period which elapsed between the date on which the application for a basic patent was lodged and the date of the first authorisation to place the product on the market in the community, reduced by a period of five years[15]".

Within the EU data exclusivity is provided for new chemical entities (NCEs)[16]. The exclusivity prohibits generic drug producers to file for regulatory market approval using the pioneering drugs data for eight years from the drugs approval. Additionally, a generic drug is not allowed on the market for another two years. If the pioneering drug is authorized for a new therapeutic indication during the initial eight years with a "significant clinical benefit[17]" it is eligible for an additional year. Even after the initial eight years it is possible to get a one-year extension under the same premises. Finally, if a drugs classification is changed to over-the-counter (OTC) it may enjoy data exclusivity for a year protecting that data from being used by a generic competitor also looking to change its' classification to OTC[18].

## 2.3 Competition Law

### 2.3.1 EU Competition Law

EU Competition laws' two main articles are art. 101-102 TEU. Art. 101 TEU prohibits distortion of competition and art. 102 TEU prohibits the abuse of a dominant position. Community competition law concerns the internal market; a purely national misconduct is a concern for national law of the affected nation. To be a concern of EU competition law the agreement or action needs to distort intra-community trade. Mergers between the leading patentees in a certain business, licensing agreements that create monopolies or strong market positions as well as a refusal to license can become subject to investigation under the above-mentioned articles.

[14] In a state of war or similar emergency or if the product or process that has to undergo an administrative procedure before being permitted entry to the market, Art. 63(2) EPC.
[15] Blanchard Adrienne M. Gill Kelly and Steinberg Jane, A Practical Guide to Intellectual Property Issues in the Pharmaceutical Industry, Sweet & Maxwell, London, 2007, p. 30
[16] Stipulated in Directive 2001/83/EC amended by Directive 2004/27/EC
[17] Blanchard Adrienne M. Gill Kelly and Steinberg Jane, A Practical Guide to Intellectual Property Issues in the Pharmaceutical Industry, Sweet & Maxwell, London, 2007, p. 46
[18] See *Ibid*, pp. 46-47

## 2.4 Competition Law and IP Law – A Close Relationship

Historically, there exists a discussion regarding whether there is a struggle between the two disciplines or not. That discussion often originates in whether the debaters consider patents and other IPRs as creators of monopolies or not. This struggle has been described as a struggle between ”monopolists v anti-monopolists[19]”. Even though these are recent words the important economic theories of the Chicago School who ”began to treat patent rights as simply a species of property, with the attendant power to exclude rather than as a species of monopoly[20]” has had a big impact on the debate in the U.S. as well as in the EU. With that Competition Law and IP law has increasingly been seen as complementary instead of as a competitive set of rules. The U.S. Supreme Court agreed with the changes in the conception of patents when they said that ”a patent does not necessarily confer market power upon the patentee[21]” in the ruling in *Illinois Tool Works, Inc. V. Independent Ink, Inc.* The ECJ also distinguish “between the *existence* and the *exercise* of IPRs[22]”. “The origins of the existence/exercise distinction can be traced back to the European Court of Justice’s 1966 decision in *Consten and Grundig v Commission*[23]”. In both these cases the courts clarifies that even though IPRs can be used in a contra-competitive manner, they are nevertheless not contra-competitive by nature.

Looking at the economic policies of the EU and the statements made by EU officials, the status and goal of the relationship between competition law and IPR is quite clear. In the treaties it says “The Member States and the Union shall act in accordance with the principle of an open market economy with free competition, favoring an efficient allocation of resources, and in compliance with the principles set out in Article 119[24]”, which are “an open market economy with free competition[25]”. Commissioner Monti clarified his views on the treaty and competition law in his *European Competition Policy for the 21st Century* speech at The Fordham Corporate Law Institute by saying that “the fundamental role of the market and of competition in guaranteeing consumer welfare, in encouraging the optimal allocation of resources, and in granting to economic agents the appropriate incentive to

[19] Jacob. Sir Robin, Foreword to Valentine Korahs ”Intellectual Property Rights and the EC Competition Rules, Hart Publishing, Oxford and Portland, Oregon, 2006.
[20] Hovenkamp, Herbert J. (2005). United States Antitrust Policy in an Age of IP Expansion. UC Berkeley: Berkeley Center for Law and Technology. Retrieved from: http://escholarship.org/uc/item/2dd2t28b, p. 21. (Last visited on March 25, 2010)
[21] 547 US 28, 126 S.Ct. 128 at 1293 (2006)
[22] Curley. Duncan, Balancing intellectual property rights ad competition law in a dynamic, knowledge-based European Economy, from The Intellectual Property Debate, edited by Perez Pugatch. Meir, Edward Elgar Publishing, Cheltenham, UK and Northampton, MA, USA, 2006, p. 213-214.
[23] *Ibid*, p. 214.
[24] Art. 120 Treaty on the Functioning of the European Union
[25] Art. 119 (1) Treaty on the Functioning of the European Union

pursue productive efficiency, quality and innovation[26]" In 2004 the commission also stated that "the objective of Article 81 [now art 101] is to protect competition on the market as a means of enhancing consumer welfare and of ensuring an efficient allocation of resources[27]". The commission at the same time said that "IPR is important for the progress of society by giving creative and inventive people the incentive to develop products that improves everyday life, contributes to economic growth and in the prolonging actually increases competition and creates dynamic efficiencies[28]". Herbert J. Hovenkamp is of the same opinion and describes the source of the diverging views when he writes; "The idea that there is a tension between antitrust and the intellectual property laws is readily exaggerated. The tension that exists results mainly from our uncertainty about the optimal amount and scope of IP protection[29]". It is constantly the struggle for the most efficient market and consumer welfare that drives the discussion onward. In this struggle one mustn't forget that it isn't only IP law that can distort competition; innovation-distorting competition is an equally alarming problem. The U.S. DoJs Antitrust Division issued a statement after the Fair Trade Commission of Korea demanded Microsoft to sell versions of Windows without Windows Media Player and Windows Messenger saying that "Sound antitrust policy should protect competition, not competitors, and must avoid chilling innovation and competition even by 'dominant' companies[30]"

Since the acceptance of patents as a property much like any other property, the scope of competition policy has changed. Competition agencies are now monitoring the use of patents instead of patents themselves as they can be used to create unwanted market conditions such as monopolies and abusive behaviour. The *raison d'être* for competition law is to prevent any disruption to competition, regardless of source.

In the quest for the optimal patent length for an innovative market it is not enough to look at IP law and policy, competition law and policy is a crucial part of the equation as well.

[26] Glader, Marcus, Innovation Markets and Competition Analysis, Edward Elgar Publishing, Cheltenham, UK & Northampton, MA, USA, p. 10
[27] Guidelines on the application of Article 81(3) of the Treaty, §13, OJ C 101/97, 2004
[28] Guidelines on the application of Article 81 of the EC Treaty to technology transfer agreements, OJ EC 2004 No. C 101, p. 2, para. 7.
[29] Hovenkamp, Herbert J. (2005). United States Antitrust Policy in an Age of IP Expansion. UC Berkeley: Berkeley Center for Law and Technology. Retrieved from: http://escholarship.org/uc/item/2dd2t28b, the abstract. (Last visited on March 25, 2010)
[30] Anderson, Robert D., Competition policy and intellectual property in the WTO, from the "Research handbook on intellectual property and competition law" edited by Drexl, Josef, Edward Elgar Publishing, Cheltenham, UK & Northampton, MA, USA, 2009 p. 461

# 3 Patent Practices in Different Industries

In certain industries a patent is worth more than in others. For instance, in the pharmaceutical industry, a pioneering drug can be an enormous source of revenue whilst under the protection of a patent. Since the value of a patent on a successful drug is significant there is an equally significant incentive to maintain that market situation as well as it is for the competitors to enter the market as soon as possible to get a piece of the pie. Therefore, it is common that big enterprises dependent on innovation have adopted strategies relating to maximizing profits from the use of patents. Even followers such as the generic drug companies have adopted strategies on how to handle patents to promote their own business. The pharmaceutical industry is famous for their use and abuse of the patent system but they are not the only ones who have understood the value of a patent strategy. Other innovative industries, such as the biotechnology or computer hardware industries have strategies of their own. The markets, which these industries act in, are different and so are their strategies.

## 3.1 Industry Approaches

### 3.1.1 Long Life Cycle Industries

#### 3.1.1.1 The Pharmaceutical Industry

The pharmaceutical sector is a fundamental part of the health care industry. Today that sector employs 10% of the European workforce and is expected to grow even bigger as the population of Europe and the developed world is getting older. Therefore the need for new, cheaper, better and more drugs is ever increasing. The hope is that enhanced enforcement of competition policy within the pharmaceutical sectors will allow the important generic sector to grow, which in turn will lower costs for national health agencies as well as consumers. In the same time, the goal is to protect small and medium enterprises (SMEs) from abusive behaviour and impede the strategic use of patent procedures of dominant undertakings to promote competition in innovation instead of prolonging existing cash cows.

The pharmaceutical industry is considered a long industry where many of the successful drugs are relevant and profitable for the entire patent length and even longer. It is therefore important to prolong a patent as much as possible for the patent holders; the competitors have at the same time much to gain from being able to enter the market as soon as possible.

One common practice is to apply for various patents regarding the same drug "forming so-called 'patent clusters' or 'patent thickets[31]", "… an important objective of this approach is to delay or block the market entry of generic medicines[32]". These 'patent clusters' usually consists of just about a hundred patents adhering to just one drug. This can mean up to 1300 patents or applications regarding one drug within the community. Such a significant number may be hard for a competitor to grasp and contest. Even if the main patent isn't strong and might not hold up in court the patent holder seeks safety in numbers[33]. The generic producers more often oppose these applications than competitors in other product markets; the average opposition rate for the pharmaceutical industry is 8%, whereas the EPO average is 5%. The generic companies are successful in their opposition 60% of the time but the opposition and appeal procedures usually last about two years from start to finish, which is valuable time lost on the market[34].

Another strategy employed by pioneering drug companies is to apply for a 'divisional patent'. "Voluntary divisional patent applications, which are foreseen in patent law as a legitimate way to split an (initial) parent application, cannot extend the content of the original application nor the protection period but they can extend the examination period of the patent office, as the examination of divisional applications continues even if the patent application is withdrawn or revoked which, under certain conditions, can add to the legal uncertainty for generic companies[35]". However, the Administrative Council of the EPO has tried to limit this kind of behaviour by changes to their regulations.

The strategies are plentiful, an important one is to consistently litigate the patents, and even the threat of litigation is useful to scare off competitors. According to the Commission, litigation over patents was four times as many in 2007 than 2000. The majority of the cases were initiated by the patent holder, even though the defendants won 62% of the cases [36]. In many of the cases the patent holders requested interim injunctions. 18 months was the regular interim period when such an injunction was awarded. Yet, in 46% of these cases the generic drug producer came out as victorious. The aim as we can see from these numbers isn't always to win the case but to delay the competitor. When the revenue of a drug is high, such delays to competing entrances can be very profitable for the patent holders and, at the same time very costly to society.

A significant number of these disputes are either settled or an agreement is made before it reaches the litigation stage. Agreements regarding generic drugs often consider the sale/distribution around the time of the expiration

[31] Communication from the Commission, Executive Summary of the Pharmaceutical Sector Inquiry Report, p. 10.
[32] *Ibid,* p. 10
[33] See *Ibid*, p. 10
[34] See *Ibid*, p. 12
[35] *Ibid,* p. 11
[36] See *Ibid*, p. 11

of a patent. The settlements are usually slightly different and does not seldom entail restrictions on the capacity of marketing a generic drug, and in return they generic companies often received some kind of reward; "either in form of a direct payment or in the form of a license, distribution agreement or a 'side-deal'[37]". The direct payments are questionable from a competition policy point of view and have also been a source of concern to the anti-trust agencies in the U.S.

According to the Commission's Pharmaceutical Sector Report the delay tactics extends to the marketing authorisation proceedings. Patent holders raised claims that were only substantiated in 2% of the cases even though they had more success, 19%, in claiming violations against data exclusivity. The reason for these claims is thought to be once again to delay the entrance on the market of a competing drug, on average four months[38].

Two further strategies seem to be to influence the middlemen, i.e. authority figures in medicine and distributors by questioning the quality of generic drugs, as well as influencing suppliers of vital ingredients to the competitors. Both strategies aim on creating obstacles for entry to the relevant market[39].

Another option available to pioneering companies is to launch an improved patented version of the pioneer drug, which usually takes place approximately a year and a half before the pioneer drug's patent expires. The objective is to build a relationship with the customers before the competitors are able to. The importance of this tactic increases in relation to how significant the improvement is. The more significant improvement, the less important is the use of the tactic[40].

It is not just against generic drug companies that tactics are being employed. They are also brought into play to stem the pioneer drug competitors R&D, or, some companies say, to create licensing opportunities. There are, according to the commission, patents designed to block other companies R&D projects with minor patented innovations within the research field. Most of they time a licensing agreement is reached but when it is not, an important innovation can be effectively blocked for the duration of that patent[41].

Pioneering companies frequently challenges each other's patents, mainly when it comes to patented improvements of old drugs and they are successful in doing so about 70% of the cases[42].

[37] *Ibid,* p. 13
[38] See *Ibid,* pp. 13-14
[39] See *Ibid,* p. 14
[40] See *Ibid,* p. 15
[41] See *Ibid,* p. 16
[42] *Ibid.* p. 16

The extent of the abuse of the above mentioned strategies and tactics and its impact on society is difficult to measure or even estimate but it is clear that any delay can mean significant profits to patent holders and most likely equal loss to society. To employ a patent strategy isn't illegal *per se* but as you could see above there is a fine line between use and abuse of patents. Thus have some of the patent strategies resulted in important judicial rulings and legislative changes.

#### 3.1.1.1.1 The Bolar Exemption

In the U.S. a drug needs to be approved by the Food and Drug Administration (FDA) before being allowed on the market. In the Bolar case[43] the Bolar Pharmaceutical Company started testing an active ingredient patented by Roche Products Inc. before the patent life had expired so that they could acquire an approval before the expiration of the patent as to be able to release their generic drug upon the market the same day the patent expired. Under U.S. patent laws at the time, it was prohibited to make, sell or use a patent under the duration of the patent time. Roche claimed that Bolar infringed on their patent since testing clearly fell under the definition of using the patented innovation. Bolar argued that since an approval by the FDA customarily took two years it meant that the *de facto* life of a patent was two years longer than stipulated. The court[44] deemed Bolar's tests to be of commercial nature and therefore ruled in the favour of Roche.

Congress however agreed with Bolars' reasoning and voted through the Waxman-Hatch amendments to the Federal Drug and Cosmetics Act[45] (FFDCA). Quintessentially, this meant that the process for a FDA approval was simplified since generic drug producers no longer needed to show safety and efficacy data as they could use the data already submitted by the patent holder and they could start the testing before the expiration date of the patent. The pioneering drug companies on the other hand was awarded the possibility to extend the patent time since they also had to endure a lengthy approval process before being able to profit from their invention. Furthermore, there were some changes made to the resolution of infringement disputes. A generic drug producer is now obliged to notify patent holders on possible infringements and the patent holders may claim patent infringements before the generic drug is marketed[46]. A regulation that bestows the possibility to test and file for an approval to market the product before the expiration of a patent is known as a Bolar Exemption.

[43] Roche Products Inc v Bolar Pharmaceutical Co, 1984
[44] United States Court of Appeals, Federal Circuit. – 733 F.2d 858
[45] 21 U.S.C. §301 et seq. FFDCA
[46] See Connolly Bove Lodge & Hutz LLP, Waxman-Hatch Law: What's Better For The Nation's Public Health, More Research Or Cheaper Generic Drugs?, http://library.findlaw.com/2000/Sep/1/131297.html (Last Visited on May 12, 2010)

Since the amendment of the Waxman-Hatch to the FFDCA Canada and the EU among others has followed suit. The EU however, before introducing similar legislation of their own contested Canada's Bolar Exemption in view of the fact that it was a breach against the TRIPS agreement and brought Canada in front of the Dispute Settlement Body (DSB) of the WTO. Canada had extended the exemption by allowing for production and stockpiling of generic drugs before the expiration date of a patent. The EU contested the exemption as a whole but the DSB rejected EU's claim regarding the Bolar exemption but concurred with the complaint on the stockpiling and deemed it "not consistent with the requirements of Article 28.1 of the TRIPS Agreement[47]". EU introduced a Bolar exemption through Directive 2004/27/EC, which amended Directive 2001/83/EC.

#### 3.1.1.1.2 The AstraZeneca Decision

In 2005 the Commission adopted a decision[48] to fine the dominant undertaking AstraZeneca (AZ) as they conducted abusive behaviour by strategic use of their patent to distort competition. AZ held a patent for the active ingredient of the hugely successful drug Losec, "with annual sales reaching around six billion euros towards the end of the 1990s[49]". In the decision AZ was condemned for an infringement that " constitutes a single and continuous abuse and consists of a pattern of misleading representations made by AZ before patent offices in Belgium, Denmark, Germany, the Netherlands, Norway and the United Kingdom and before national courts in Germany and Norway[50]". AZ wanted an extension of their expiring patent under the SPC Regulation to delay generic drugs on their lucrative market and therefore provided misleading information according to the Commission. Furthermore AZ tried to delay, according to the Commission, generic drugs by deregistering their market authorisation for Losec capsules and launch their patented Losec Mups tablets. They did this before the patent of Losec expired in 1999, in this way competitors couldn't base their marketing approval of their generic drugs on an already existing drug and it would delay their entry on the market. The deregistration only took place in markets where, due to the legislation, it delayed competing drugs to enter the market. This second alleged infringement is of less importance today due to changes in the relevant legislation. AZ has appealed the decision to the CFI and a ruling is pending in the case[51].

The AZ decision is important because it meant a shift in the Commission's competition agenda. "Since *AstraZeneca*, the focus of competition policy

[47] WTO DSB, Canada – Patent Protection of Pharmaceutical Products, WT/DS114/R, March 17 2000
[48] COMP/37.507 — Generics/Astra Zeneca, 15 .06.2005.
[49] Fagerlund Niklas and Rasmussen Soren Bo, AstraZeneca: the first abuse case in the pharmaceutical sector, EU Competition Policy Newsletter, Nr 3 Autumn 2005, http://europa.eu.int/comm/competition/publications/cpn/, p. 54
[50] *Ibid* p. 54
[51] Case T-321/05 CFI

enforcement action in pharmaceuticals in the EU has been twofold. First, there is the traditional focus on intra-brand competition, by going after barriers to parallel trade in pharmaceuticals within the Single Market. Second, the adoption of the *AstraZeneca* case has heralded a new era in the Commission's enforcement activities in pharmaceuticals aimed at promoting inter-brand competition by spurring on innovation between pharmaceutical producers and by increasing price competition stemming from generic entry after patent expiry[52]".

#### 3.1.1.2 The Biotechnology Industry

The biotechnology sector is rather similar to the pharmaceutical industry in that they both rely heavily on patents to retrieve high sunk costs in R&D. The R&D investments within this industry are about twice that of the pharmaceutical and the uncertainty of the commercial result of R&D within the industry is very high and therefore entails very long R&D cycles. Patents are, due to this very useful to attract much needed investment from venture capitalists. Competition does drive innovation forward but as in the pharmaceutical industry the patents are essential to exclude free riders[53].

The patent strategies that were stressed as particularly alarming in the FTC report on innovation were the ones who resulted in creating anti-commons[54]. An anti-common is when several companies hold patents in one area so that all are excluded from using their patents. This often occurs due to defensive patenting where companies create 'patent thickets' to protect themselves very much in the same way as in the pharmaceutical industry.

### 3.1.2 Short Life Cycle Industries

#### 3.1.2.1 Computer Hardware Industries

The computer hardware industry is also a very innovative one but quite different from the two previously mentioned. The product cycles are much shorter and one final product can contain hundreds if not thousands of patents. In this industry patents are not the main source spurring innovation. Since the life cycle is short, it is much more important to be the first on the market and constantly come with improved products. Trade secrecy can also be of good use.

Patents are considered useful to prevent free riders and create business opportunities through licensing but 'patent thickets' are considered as a big

[52] De Souza Nadia, Competition in Pharmaceuticals: the challenges ahead post AstraZeneca, EU Competition Policy Newsletter, Nr 1 Spring 2007, http://ec.europa.eu/competition/publications/cpn/, p. 39.
[53] To Promote Innovation: The Proper Balance of Competition and Patent Law and Policy, A Report by the Federal Trade Commission, October 2003, Ch. 3 pp. 15-17 http://ftc.gov.os/2003/10/innovationrpt.pdf (Last reviewed 2010-05-18)
[54] *Ibid,* Ch. 3 pp. 24-5

problem. Since it takes several years to litigate a claimed infringement and a state of the art manufacturing facilities can cost more than four billion dollars to build and may very well be superseded within five years[55]. Due to these short product cycles there is no room for lengthy negotiations and litigations. Patent thickets that may very well contain vast amounts of invalid or too broad patents becomes an effective block or a Hold-Up[56] for competitors that may be forced into agreements they originally didn't want or that they don't actually need just to avoid lengthy and costly litigations.

#### 3.1.2.2 Yamaha v. Bombardier

In a case within an industry with similarly short product cycle Yamaha brought Bombardier in front of the International Trade Commission. Yamaha claimed that Bombardier infringed on their patents regarding Personal Watercrafts (PWCs). Bombardier responded with accusing Yamaha of using anti-competitive patent strategies.

In this particular industry there were only three other significant competitors on the market at the time. Design and innovation are the driving forces of competition and much like the car industry it is crucial to introduce new products and features in the beginning of the calendar year. Changes in production can be fatal as dealers expect to fill their showrooms at the beginning of each year. Delays due to alleged patent infringements can have big effects. Yamaha held about 90% of all patents within the industry, their competitors deemed that the majority of all innovations were incremental and too small to be patentable and therefore didn't bother with patents. The dispute was settled before the International Trade Commission reached a verdict but this case is a good example of how companies can distort the competition in industries with incremental innovations with short life cycles by having differing views on patenting[57].

[55] *Ibid,* Ch. 3, p. 31
[56] *Ibid,* Ch. 3, p. 40
[57] Rubinfeld Daniel L. and Maness Robert, The Strategic Use of Patents: Implications for Antitrust, from; Antitrust, Patents and Copyright, Edited by François Lévêque and Howard Shelanski, Edward Elgar, Cheltenham, UK and Northampton, MA, USA, 2005, pp. 92-94

# 4 Alternatives to Patents

## 4.1 Background

It is clear that economic growth is highly valued by our society and that innovation is regarded as one of the most important pillars of economic growth. Is the most efficient way of achieving innovation to grant patents to inventors or could we be more innovative in our quest for economic growth? What would happen if we lived in a patent free world is a difficult question to answer. The patent system or a system resembling a patent has been around for centuries even though the origin is disputed[58]. In the leading innovative markets patents have always existed to protect innovation, which makes it hard to estimate what a progressive society without them would look like.

In the quest for minimizing 'innovation spending' there is good reason to examine not just the necessity of optimal patents but whether patents should be abolished as a whole to induce free exchange of ideas and support the innovative spirit. As will be shown in this chapter, several industries support other methods of protecting or exploiting their innovations.

## 4.2 Alternatives

### 4.2.1 Trade Secrets

One alternative to patents is to keep the information secret, "Various empirical studies have found that secrecy and lead time are more highly ranked than patents as a protection mechanism for both product and process innovations and have increased in importance over the last decade[59] ". Given that the inventor has the possibility to keep the information or at least significant parts of the invention a secret and that the inventor expects the cost of secrecy to be lower than the cost of patenting, it is an even greater protection than a disclosing patent.

[58] See, Fisher Matthew, Fundamentals of Patent Law, Hart Publishing, Oxford and Portland. OR, 2007, p. 23

[59] Denicoló, Vinzenco & Franzoni, Luigi Alberto, Innovation, Duplication, and the Contract Theory of Patents, from the book The Economics of Innovation, edited by Cellini, Roberto & Lambertini, Luca, Emerald Group Publishing Ltd, Bingley, UK, 2008, p. 15,

### 4.2.2 Lead-times

Lead-time, also considered more valuable than patents[60], is useful in two ways in particular. First, it means that the producer has a head start on building an important relationship with the consumer by putting his trademark on the product or service. This way he can create positive associations towards the brand so that later on when the customer has the opportunity to choose between several products he will most likely choose the one he recognises and has previous experience with. One important difference from trade secrets is that branding is possible as an extra protection on top of a patent whereas keeping trade secrets is a substitute since once it is patented all information is out in the open. However, it is possible to patent parts of the product or process and keep other parts a secret.

The second advantage with lead-time is market recognition and learning curve advantages[61] towards the competitors. The extra costs that learning a new market and a new trade entails will make the following producers less competitive and gives the leading company the opportunity to choose the most lucrative position on the market.

### 4.2.3 Research Grants

A research grant is usually created by a private foundation or by the state. It can either be an open grant or a specific grant where the grantor has chosen a certain subject to research. The outcome of the research is often meant to benefit the public as opposed to being commercialized for profit.

### 4.2.4 Prizes and Awards

Prizes and awards can also be used to inspire innovation. Either "ex-ante, for example the Longitude Prize set in 1714 by the English Parliament, or ex-post, for example the Nobel Prizes[62]". These two examples, as most awards or prizes, are created in much the same spirit as research grants in that they are meant to benefit society.

[60] Denicoló, Vinzenco & Franzoni, Luigi Alberto, Innovation, Duplication, and the Contract Theory of Patents, from the book The Economics of Innovation, edited by Cellini, Roberto & Lambertini, Luca, Emerald Group Publishing Ltd, Bingley, UK, 2008, p. 15,
[61] *Ibid*, p. 153
[62] Gowers, Andrew, Gowers Review of Intellectual Property, HM Treasury, London, 2006, p. 24

### 4.2.5 Conclusions

So, if it is preferred to act by lead-time or by secrecy, why do we need patents? First of all, not all prefers these two alternatives. A company may not always be able to keep an innovation a secret; it depends on the nature of the innovation. Furthermore, the advantages of lead-time may not always be as decisive, especially if a competitor is on the market or a very similar market already. The pharmaceutical industry for one produces new products, to a great cost, that are easily imitated. They need to disclose their information to the national boards of health in the countries where they wish to market their products. Trade secrets are therefore difficult to keep, and substances may also be exposed to reversed engineering.

Lead-time has predicaments of its' own, for instance it is not always so advantageous if a company needs to recoup heavy R&D investments, the costs of which are often very high within the pharmaceutical industry for example. Even though a company has the advantage of brand recognition and knowledge and experience of the market, a competitor who doesn't need to calculate the costs of R&D into the price of the final product can sell it for much less, which will outweigh the advantages of being the first. In addition, competitors in mature markets are often well established which decreases the lead-time advantage significantly if it is relatively easy to duplicate the product.

Trade secrets cost to society is the same as patents if not higher since that also excludes others from using the invention. Patented information can be used for non-commercial research which secret information cannot. The revelation of know-how and new technologies inherent in a patent application is considered to be of great value for society even though others are prohibited to use the information for the duration of the patent. Disclosure of knowledge spurs further innovation and a blocking patent can always be licensed. A secret on the other hand does not spur innovation and can theoretically stay a secret and block innovation for a longer period of time than patents does. Furthermore, the patent has two values that are preferable to trade secrecy according to Clarissa Long[63]. The first one is when seeking investors or others of interest to share information with; the patent provides a cheap way of disclosing the information without having to resort to expensive and time-consuming confidentiality agreements. The patent itself also conveys a value to market actors, independently of what is actually patented. They can portray an image of successful R&D and considered valuable assets even though they often are very difficult to appraise. Despite mentioned difficulties they reduce the evaluation costs of a company for venture capitalist among others[64].

Research grants and prizes are admirable ways of achieving innovation. The problem is that you need a jury or a board to administer the grants and the

[63] See, Fisher Matthew, Fundamentals of Patent Law, Hart Publishing, Oxford and Portland. OR, 2007, p. 163
[64] *Ibid* p. 163-164

limitations of the competition. Who's to say that they are the most equipped to determine the needs of society, and it is difficult to foresee who's most likely to achieve those goals of the individuals or enterprises eligible for a grant. In addition, in the case of government funding, everyone pays for innovations that might just benefit a few. A patented innovation only transfers costs on the consumers of that invention.

From this examination the conclusion is clearly that patents serve a valuable purpose, the examined alternatives are of good use as complements to patents, not substitutes, and together they offer a wide range of tools for innovation protection.

# 5 Optimal Patent Length

## 5.1 Background

The first patent awarded in England by Henry VI in 1449 was awarded for a period of twenty years[65]. It is the same today but nowhere does it say why twenty years has been chosen as the appropriate length of a patent. In the reasoning behind the Swedish patent law[66] it plainly says that the length of a patent is twenty years, which is an adaptation to the EPC, which in turn is based on the TRIPS Agreement but there is no explanation as to why twenty years. Nor is there any explanation to be found in the literature. Herbert Hovenkamp writes that "… But this uncertainty is not nearly as broad or deep as the level of our uncertainty over intellectual property questions such as What is the optimal length of time for patent or copyright protection?[67]" Twenty years seems to have been an arbitrary length of time decided upon by the legislators. Despite the seemingly capricious protection time there has been a number of studies performed on the subject and several theories put forth with widely ranging opinions.

## 5.2 Theories on Optimal Patent Length

Different systems and theories behind the optimal length of a patent have been discussed but so far without any conclusive solution. Below I will highlight some of the more prominent ones. There are scholars from multiple academic fields who attack the conundrum in both a technical and a theoretical fashion.

The economist Joseph A Schumpeter argues that we do not need to create a system for inventors but for investors in innovation. A single individual may conduct research and innovate for a number of different reasons. A profit seeker on the other hand only invests if he can expect a reward greater than his investment[68]. This proposes that the parameters determining the length of patents should be based upon the time required to recoup the investment and make a reasonable profit. A precondition for such a system to be successful is to be able to determine the profitability of an invention *ex-ante* the product launch, something government agencies are ill equipped to do. Even investors themselves find this very challenging. An *ex-post* evaluation wouldn't be advisable neither since that would induce accounting fraud or at the very least creative accounting to prolong the patent time. At the same

[65] See Gowers, Andrew, Gowers Review of Intellectual Property, HM Treasury, London, 2006, p. 18
[66] *Patentlag* (1967:837)
[67] See Hovenkamp, *Supra Note* 19. p. 4
[68] See, Fisher Matthew, Fundamentals of Patent Law, Hart Publishing, Oxford and Portland. OR, 2007, p. 138

time it would be difficult for competitors to foresee when the patent expires so that they can prepare a product launch of their own. In addition, it would create great difficulties in determining which costs are inherent to what, to what extent is the cost of building a new laboratory traceable to a certain medicine if several different projects are being developed within the same facility.
A final predicament with such a solution is that it would encourage excessive patent races. Since it is only one innovator who receives the benefits of a patent and the extra costs of becoming the first would prolong the patent time, i.e. the winning innovator could transfer the extra cost on the consumers in the form of a prolonged patent length. This would induce wasteful spending upon society.

Steven Anderman writes, "Regulating IPRs by varying the length of protection depending of the balance between social benefit and social costs have been acknowledged to be impractical[69]". It would be difficult too foresee the social benefits of a patent since it depends on so many factors and circumstances. To measure the social benefits and social costs to decide the appropriate length of a patent would result in legal uncertainty for inventors seeking patents on an early stage, even *ex-post* it is a truly difficult estimation. Anderman also says that "... it seems to be overly optimistic to expect that IPR legislation by itself can regulate the exercise of IPRs so comprehensively that it meets the objectives of public policy generally and competition policy in particular[70]". In other words, the optimal patent law policy is not to be found in IPR legislation alone, but in the connection with other legislations, most notably with competition law.

Another economist, William D. Nordhaus, was probably the first to seek the solution to optimal patent length by using economic models. In a reply to a response on his paper *The Optimum Life of a Patent* Nordhaus concludes that; "First. A fixed patent life is not optimal in theory, although it may be unavoidable in practice. If we are to err on one side, the analysis suggests too long a patent life is better than too short a patent life. For run-of-the-mill inventions[71], the losses from monopoly are small compared to the gains from invention. The best way to prevent abuse is to ensure that trivial inventions do not receive patents. Second, the complications arising from risk, drastic inventions, imperfect product markets, and 'inventing around' patents generally point to a longer rather than shorter patent life. Third, the argument for compulsory licensing without government subsidy is inconsistent with the model of invention used here. Since licensing is feasible in the absence of compulsory licensing, it cannot (in this model) increase the profits from invention and must therefore lower the level of invention. This will be desirable if and only if the optimal life is less than

[69] Anderman. Steven D, "EC Competition Law and Intellectual Property Rights", Clarendon Press, Oxford, 1998, p. 249.
[70] *Ibid* p. 249
[71] By run-of-the-mill Nordhaus mean inventions that does not mean significant reductions in price nor significantly increased output.

the actual life (and conversely)[72]". The most important implication on patent policy by Nordhaus in this paper is probably that if we are uncertain on the optimal length, which we are, it is better to go with longer than shorter patents, to raise the bar on awarding patents and promote licensing in the place of compulsory licensing. The problem with these conclusions is that that they're drawn from a simplistic model that even though it presumably contributes with a valid point, it can't respond to all the complexities and variations that exists in reality.

Followers, such as Paul Klemperer, also tried to find the answer in economic models. In his paper *"How broad should the scope of patent protection be?"* he examines the optimal shape of a patent and summarizes his conclusion with saying that; "In particular, infinitely lived, narrow patents are typically desirable when substitution costs between varieties of the product are similar across consumers, but very short-lived, wide patents are desirable when valuations of the preferred variety relative to not buying the product at all are similar across consumers. Thus, for example, if potential customers have varying levels of need for a computer program (because they would use it with varying frequencies) but have similar strength of preferences between a program that is easy to learn and harder-to-learn copies, a narrow but very long-lived patent (or copyright) is probably called for. If, on the other hand, potential users have similar needs for a drug to cure a serious disease but alternative possible formulations of the drug produce side effects which are of different severities for different patients, a broader but probably shorter-lived patent is likely to be preferable[73]". Klemperer's model is based on assumptions and relies on certain givens, for instance that all consumers should have similar preferences or similar substitution costs, which is rarely or never the case in reality. He admittedly says that "…we must be extremely cautious about drawing policy conclusions from this simple model[74]" and there are many considerations left out in this model. It is therefore not a comprehensive answer to the question of optimal patent length but successive economists still refers to Klemperers model and it is therefore worth mentioning.

Richard Gilbert and Carl Shapiro, economists from The University of California, Berkeley and Princeton University respectively, published a different economic model with a different conclusion the same year as Klemperer. In their conclusion they wrote; "Given the overall level of reward to innovators, our analysis suggests that appropriate treatment of intellectual property calls for longer patent lives combined with more careful antitrust treatment of patent practices, such as the provisions of

[72] Nordhaus Wiliam D., The Optimum Life of a Patent: Reply, The American Economic Review, Vol. 62, No. 3, June, 1972, pp. 430-431, http://links.jstor.org/sici?sici=0002-8282%28197206%2962%3A3%3C428%3ATOLOAP%3E2.0.CO%3B2-%23 (Last reviewed 2010-05-07)

[73] Klemperer Paul, How broad should the scope of patent protection be?, RAND Journal of Economics, Vol. 21, No. 1, Spring 1990, p. 127, http://links.jstor.org/sici?sici=0741-6261%28199021%2921%3A1%3C113%3AHBSTSO%3E2.0.CO%3B2-A (Last reviewed 2010-05-05).

[74] *Ibid* p. 127

licensing contracts. Of course, if the current level of rewards to innovators is viewed to be inadequate, then it may be appropriate to give stronger protection from infringement even as patent lifetimes are extended. Our point is that longer patent lifetimes are optimal, whatever one believes about the overall level of rewards to innovators, so long as patent breadth is increasingly costly in terms of deadweight loss.[75]" Gilbert and Shapiro also acknowledge their models limitation as a basis for patent policy. They for instance point out the difference between Klemperer's result and their own as well as the fact that their model is based on the "assumption that the underlying environment is stationary. We made this assumption to focus on a single invention. In practice however, inventions build on each other…[76]" They disregarded the desire in innovation policy to make innovations available for others to build on. Their model presents the same problem as the others and it highlights the complexity in finding one solution to the patent length dilemma.

Two years later Nancy T. Galliani, from the University of Toronto contested the findings of Gilbert and Shapiro that patents should be infinite and narrow by claiming that the "optimal policy should consists of broad patents (no imitation allowed) with patent lives adjusted to achieve the desired reward[77]". Galliani bases her patent policy on trying to limit costly imitation, which is an important factor to include in policymaking but hardly the only one. Imitation or 'inventing around' may not always be a bad thing, it may lead to different and perhaps more efficient methods of obtaining a desired result.

In a later edition to the quest of finding the answer or at least parts of it, Michele Boldrin and David K Levine building on Gilbert and Shapiro (1990), added their findings in their report *"Intellectual Property and the Scale of the Market"*. In the abstract they deduce that; "Intellectual property protection involves a tradeoff between the undesirability of monopoly and the desirable encouragement of creation and innovation. As the scale of the market increases, due either to economic growth, or the expansion of intellectual property rights through treaties such as the World Trade Organization, this tradeoff changes. We show that generally speaking, the socially optimal amount of protection decreases as the scale of the market increases.[78]" Boldrin and Levines suggestion is basically to adjust the length of a patent depending on the appropriate market size. This can be difficult

[75] Gilbert Richard and Shapiro Carl, Optimal Patent Length and Breadth, The RAND Journal of Economics, Vol. 21, No. 1, Spring 1990, p. 111, http://links.jstor.org/sici?sici=0741-6261%28199021%2921%3A1%3C106%3AOPLAB%3E2.0.CO%3B2-2 (Last reviewed 2010-05-05)
[76] *Ibid* p. 112.
[77] Galliani Nancy T., Patent Policy and Costly Imitation, The RAND Journal of Economics, Vol. 23, No. 1, Spring, 1992, p. 52. http://links.jstor.org/sici?sici=0741-6261%28199221%2923%3A1%3C52%3APPACI%3E2.0.CO%3B2-S (Last reviewed 2010-05-05)
[78] Boldrin Michele and Levine David K. Intellectual Property and the Scale of the Market, 30th November 2004, Abstract. www.frbsf.org/csip/research/**Levine**Seminar.pdf

for several reasons. First of all it is difficult to determine the relevant market, competition disputes provides a good example of that, therefore it would increase the costs of the patent system immensely, furthermore it is impossible *ex-ante* to distinguish the relevant market for a certain product. The fluctuations of the market size would also mean that patent lengths would fluctuate in correlation with the market, which creates legal uncertainty in that it is difficult for the applicant to know what to expect. Then again, the stipulated length of patent does not need to be bound to the rise and fall of market size on a daily basis, it could be regulated every five years or so. Boldrin and Levine strike an interesting point though. Since the market is expanding, due to above mentioned reasons, improved communications, free trade agreements etc. it means that it should take less time to recoup innovation costs and make a reasonable profit than it used to.

In David S. Abrams paper regarding the TRIPS Agreement, he looks at the impact of the prolongation of patent length in the U.S. from seventeen to twenty years and its' impact on innovation. He states that this is one of the few changes in the length of patents in patent laws' long history. It is an interesting and important research and he concludes that it seems to have contributed to "an increase in innovation due to patent-term extension following TRIPS[79]". However, there was more changes adherent to the TRIPS agreement then just a prolongation of the patent length with three years. The U.S. changed their patent legislation so that the patent length would be counted from the application date instead of the grant date. This somewhat reduces the benefit of the increase since the application procedure may take some time. Furthermore, the biggest obstacles to Abrams findings are "concerns about outliers, unobserved variation, misspecification, and external validity. The magnitude of the estimated effect seems inordinately high, given that extensions are relative to base protections of seventeen years, and, thus, the total extension is only on the order of seven percent[80]". He also mentions that the major increase in patent applications is within biotech, which may have increased at this moment for a number of reasons. Either a big part of biotech innovations were not financially viable until the increase in patent length, or maybe the TRIPS Agreement was signed in a moment in time, which corresponded with a moment in time when a lot of the research in the rather new industry of biotech had come to fruition. Another problem with Abrams article is the short period of time it covers, five years before and five after the Agreement was signed in 1995. Innovations, especially the important innovations needs a long time before they're ready for patenting. Finally Abrams used data on a rise in patent applications to show an increase in innovation, but a rise in applications doesn't necessarily mean more granted and valuable patents. Despite all this it is one of the few articles that consider an actual change in former legislations and the impact such a change had.

[79] Abrams David S., DID TRIPS SPUR INNOVATION? AN ANALYSIS OF PATENT DURATION AND **INCENTIVES** TO **INNOVATE**, University of Pennsylvania Law Review, June 2009, p. 1613.
[80] *Ibid.* p. 1639.

# 6 Analysis

In chapter 2 it was made clear that patents in no way are considered contradictory to competition law neither by the European nor the U.S. authorities. They even clearly say that they're good and necessary for economic growth and dynamic markets. The problem lies within patents' contradictory nature; to promote innovation by excluding others from using knowledge that is otherwise free and inexhaustible, which prevents them from further building on the existing knowledge for the possible benefit of society. The basic idea behind this is that in order to gain innovation we most spend innovation. The goal is to spend as little as possible and gain as much as possible. Since patents can be disruptive to innovation, even though they are designed and praised for the opposite reason, optimizing the patent length is crucial to minimize 'innovation spending'.

Debates and research on the optimal scope of patents and whether we need them at all has been present for centuries. New theories have come forth but there is still none that is universally embraced. They all have valid points, but none is flawless or acceptable as a sole foundation of an optimal length as can be seen in chapter 5. So, what do we do? How to best regulate? After examining the alternatives to patents in chapter 4 it is quite clear that we cannot afford to abolish them, they do serve a valuable purpose so we need to keep searching for the optimal solution, whatever it looks like.

Since there has never been a modern leading economy without a patent system and the systems in place have rarely been altered it makes it difficult to learn from history. In addition we lack a perfect understanding of the exact driving forces behind innovation and how they are affected by changes in IPR legislation but that doesn't mean that we don't have any understanding of the reasons to innovate. We do know that there is the quest for fame and fortune, there is the human curiosity, there are geniuses, there is necessity, there is the desire to cure and help and there is chance. Most likely innovation comes from a combination of the above, albeit in different proportions. A reduction in patent length does not reduce the need, nor the fame, or the amount of geniuses, nor the curiosity, or the desire to cure and help, nor does it reduce chance. It may reduce the monetary output even though other protective measures, such as trademarks, in many cases are deemed more useful. Moreover, certain innovations, especially in the field of high-tech electronics and IT, are not profitable for twenty years and certainly not cutting edge for the entire period of a patent.

In view of the above and the fact that most if not all innovation is incremental it is highly important to shorten the patent lengths as much as possible to facilitate "the mating of ideas[81]". On top of that, Schumpeter's[82]

[81] See Ridley Matt, When ideas have sex, Speech on TEDGlobal 2010, July 2010, http://www.ted.com/talks/matt_ridley_when_ideas_have_sex.html (Last reviewed 2010-07-21)

proposal to build a system for investors in innovation, in combination with Boldrin and Levine's[83] model which says that the need for long patents is reduced by the growing market, generated by the TRIPS agreement and globalization in general, suggests that it is time for a reduction in patent length. However, Abrams'[84] findings contradict what Boldrin and Levine state. What Abrams claims is that the increase in patent length also means an increase in innovation, although he also says that it mainly seems to be within the biotech industry. This shows that a general proposition regarding the optimal patent length is extremely difficult to make.

If we are to listen to Schumpeter's proposal that patents should be designed for investors in innovation, there are still several issues with the outlining of his proposal that need to be resolved. One being Anderman's[85] writings in which he argues that making individual estimations of patent lengths are impractical. For a 'patent system' to be truly optimal in an Schumpeterian way, it should consider the situation for every investor but perhaps an industry wide estimation could be useful to obtain a more individual and investment based patent length. As can be deduced from chapter 4, different industries have different needs when it comes to patents. Especially the long life cycle industries, such as the pharmaceutical and biotech industry need the entire patent period to recover high sunk costs in R&D. These industries have already received a possible extension for patent lengths, although due to long administrative approval procedures, the basic idea is for them to be able to recover massive R&D investments. Short life cycle industries deemed other measures more useful to recoup investments and make profits even if patents were still considered necessary. Companies within these industries do not, in most cases, need twenty years to bring home an investment.

## 6.1 Conclusion

To answer the posed question whether there is one optimal patent length my answer is no. The stipulated time in article 63 EPC might be optimal for one industry, but not all. It is, in my view, optimal to have more than one patent length. I believe that Schumpeter is on the right track when it comes to creating a system for investors in innovation. Inventors may innovate for a number of reasons, but to create a system for all those reasons isn't plausible. Above I listed several reasons for persons to innovate and the only one of those where a change in patent length changes the incentives to innovate is if the reason to innovate is based on the desire to make money. Therefore we should address the issue there. Since the need for investments and the time it takes to recoup the investments differ, so should the patent length. As concluded above, this differentiation between the patent lengths

[82] See Chapter 5.2
[83] See Chapter 5.2
[84] See Chapter 5.2
[85] See Chapter 5.2

cannot be based on the amount of resources invested in a product. What I propose is an industry-based differentiation dependent on the prerequisites of the different industries. Further research on which industries to differentiate from each other and what their different needs constitute is needed, but already today, patent applications are divided into different groups depending on the kind of innovation.

To determine the exact appropriate length of patents within different industries is very difficult to do, but if the aim is to create a situation where it is economically and financially advantageous for market actors to invest in innovation, a further look on Boldrin and Levine's theory can be of good use. The increasing size of markets due to globalization and free trade agreements makes the recuperation time for investments shorter and therefore should the patent length be shorter. Other parameters such as product life cycles and R&D costs are of course important to consider in these estimations. The pharmaceutical and biotech industry may, due to those reasons, not benefit from shorter lengths of patent protection. This is why the partitioning into different 'patent groups' is an important but difficult question, which innovations adhere to what 'patent group' and why? These are intriguing questions to be answered in a future investigation on the subject.

In conclusion, patents are a necessary evil. Therefore it is necessary to reduce that evil to a minimum to increase and induce innovation. In my opinion, creating different patent groups with varying lengths of time may be a valuable contribution in this quest. The partition could, suggestively, be based on industries and a length that makes it reasonable to invest in innovation within that industry, basically award investors the opportunity to regain investment and make a rational profit. This will entail approximations and generalizations of industries but at least it can be more accurate if focused on smaller groups than it is at present. What's clear to me is that the partitioning in to different groups needs to be kept very general. Even if it is deemed impossible to make any more distinctions than long life cycle vs. short life cycle products where pharmaceuticals and biotech industries are the only ones singled out into one group, it is still an improvement to today's situation where vastly different industries act under the same set of rules, regardless of what the reality actually looks like. Despite the fact that these 'patent groups' may not be optimal within themselves, society benefits from any optimization of patent lengths and even though a truly optimal system appears to be unattainable it doesn't mean that the system isn't improvable.

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